NE, 1951 Vol. 40, No. 6

MAY 21

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

The Shop Teachers' Professional Magazine

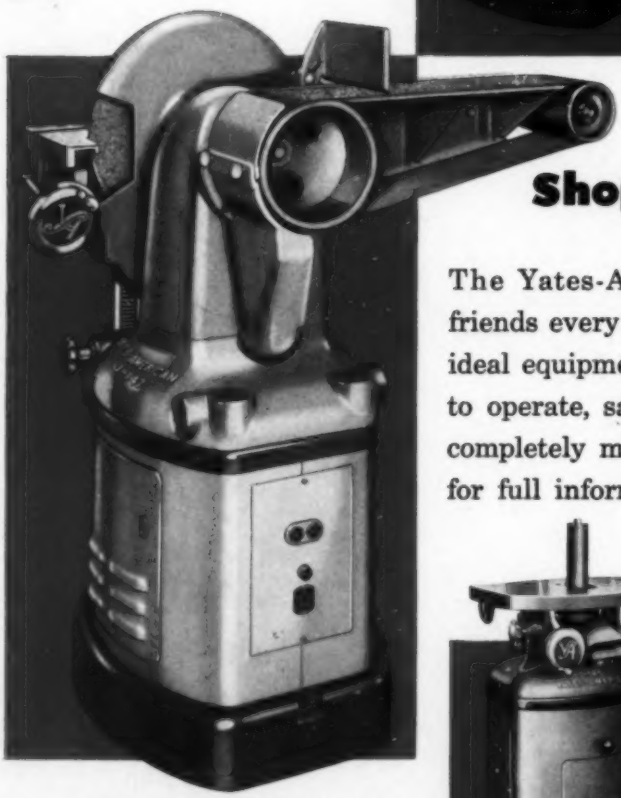
SCHOOL CLOSING NUMBER

Yates-American

announces 2 Versatile New Models

New J-150 Shaper

Here is a machine that will operate with exceptional smoothness and efficiency. Easy to adjust and operate, the J-150 Shaper greatly simplifies the production of moulding and other work involving irregular contours. Spindle is 1⅛ in. in diameter, alloy steel, runs 10,000 r.p.m. in lubricated-for-life precision ball bearings. Has 3 in. vertical adjustment, 2 hp. motor, v-belt drive, 30 x 38 in. table.



New J-147 Combination Belt and Disc Sander

Two-for-one economy in space as well as in first cost. It's a modification of the popular J-147 double disc sander, and the belt side is available both on new machines or as an attachment for those already in use. The 6 x 59-in. belt can be used horizontally or vertically, has an adjustable idler for tracking the belt or taking up slack.

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The Yates-American J-Line makes new friends every day . . . and only because it is ideal equipment for school shops. It's easy to operate, safe, sturdy, attractive . . . and completely modern in design. Write now for full information on any or all of these J-Line machines:

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- J-131 Jointer
- J-140 Mortiser
- J-150 Shaper
- J-170 Lathe
- J-180 Surfacer
- J-147 Double Disc Sander
- J-145 Spindle Sander

J-145 Spindle Sander

Oscillates 90 times a minute with ½-in. stroke. Table, 20 x 24 in. tilts 45° left, 10° right.

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MACHINE COMPANY—Beloit, Wisconsin

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Photo courtesy North Carolina State College

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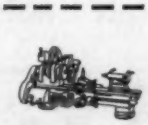
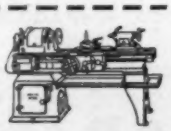


☐ 9″ and 10″ BENCH LATHES



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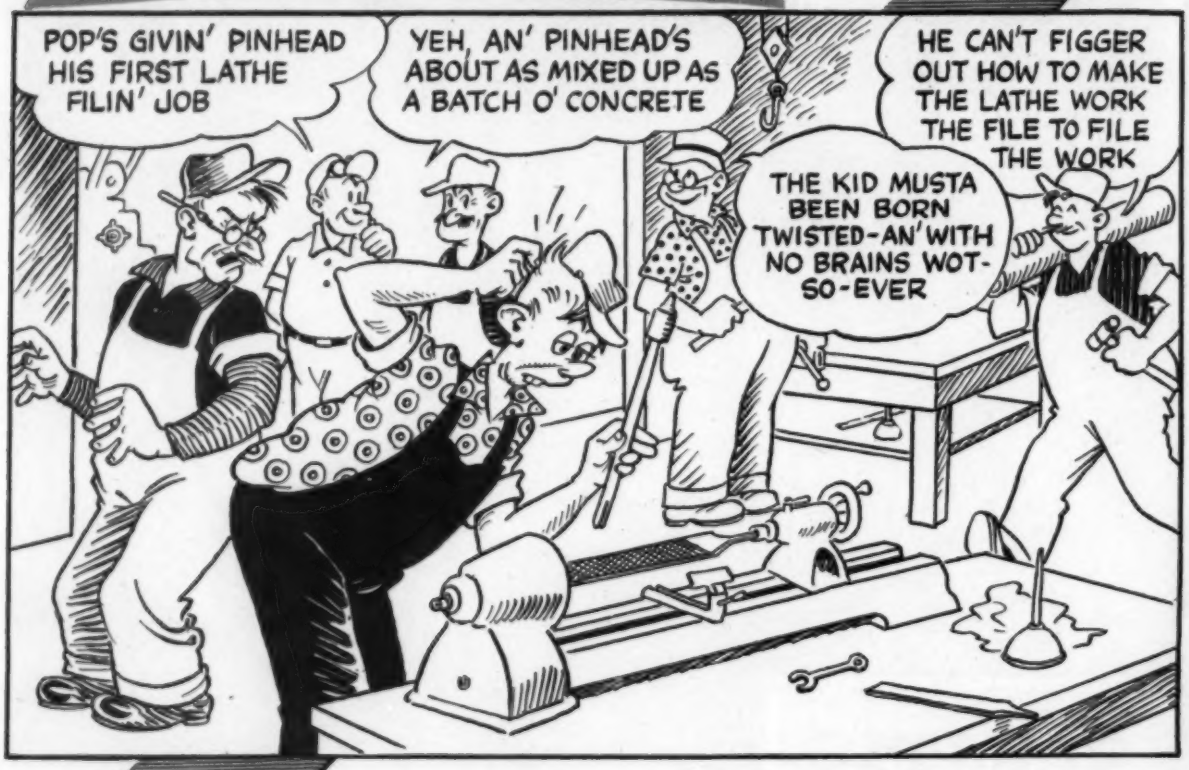
POP'S GIVIN' PINHEAD HIS FIRST LATHE FILIN' JOB
YEH, AN' PINHEAD'S ABOUT AS MIXED UP AS A BATCH O' CONCRETE
HE CAN'T FIGGER OUT HOW TO MAKE THE LATHE WORK THE FILE TO FILE THE WORK
THE KID MUSTA BEEN BORN TWISTED-AN' WITH NO BRAINS WOT-SO-EVER

THE lathe rotates the work and not the file, of course—as anybody but Pinhead would know. But not every lathe mechanic knows of the existence of a special Nicholson file that works very fast and does a beautiful job of smooth-finishing on spindles, shafts, dowel pins, hubs, gears, rolls — anything, in fact, that can be set up and spun in a lathe.

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Vol. 40 No. 6

JUNE, 1951

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

Published on the 15th of month preceding date of issue

THE BRUCE PUBLISHING COMPANY, 400 North Broadway, Milwaukee 1, Wis. • CENTRAL OFFICE: 20 North Wacker Drive, Chicago 6, Ill. • EASTERN OFFICE: 225 Broadway, New York 7, N. Y.

★ ★ ★ ★

THIS MONTH'S COVER

The cover for the June issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION shows a student in the upholstering class at the State College of Washington, Pullman, Wash.

The photograph was submitted by William A. Bakamis and William A. Kavanaugh.

1951 VACATION TIME

Best wishes for an enjoyable vacation period to all readers of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

★ ★ ★ ★

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GENERAL RELATED INFORMATION . . .

FOR VOCATIONAL TRAINEES

PSYCHOLOGY FOR LIFE ADJUSTMENT

By Charles R. Foster

In nation-wide competition this book was awarded first prize in the Life Adjustment Education manuscript contest.

The needs of students and beginning workers dictated the content of this book. Major emphasis has been placed on those sound, basic principles which are so important in adjusting to family, school, community, and industrial life. Right from the start, each student finds the solution to many of his current problems and, at the same time, he is building a fine foundation for further training in such fields as supervisory training, community leadership, training for parenthood, etc.

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ASSOCIATION NEWS

THE AMERICAN INDUSTRIAL ARTS ASSOCIATION CONVENTION

The American Industrial Arts Association Convention was held in New York City on May 2, 3, 4, and 5, 1951.

The meetings on Wednesday were taken over by two groups: the American Council on Industrial Arts Teacher Education, and the newly organized American Association of Industrial Arts Supervisors.

In the morning session of the Council on teacher education the matter of accreditation of industrial-arts education was taken up. Gordon O. Wilber, New York State Teachers College, was chairman. Gerald J. Baysinger, Wayne University, spoke on "Trends and Recommended Practices in Accreditation in Industrial Arts Teacher Education." John R. Ludington, U. S. Specialist in Industrial Arts, presented the same subject from the national viewpoint. At the afternoon session this same group took up the question of Cadet Teaching in Industrial Arts Education. The chairman at this occasion was Gerald J. Baysinger, Wayne University. William E. Huss, New York State Teachers College, presented a fine illustration of what cadet training is. Henry A. Loats, Ball State Teachers College; Kenneth F. Perry, Colorado State College of Education; Ralph K. Nair, University of California at Santa Barbara; and Roland M. Torgerson, Bowling Green State University, were the discussion leaders.

The I. A. teacher group, under the chairmanship of Walter R. Williams, Jr., University of Florida, also discussed planning the physical plant for industrial arts. Elroy W. Bollinger, State Department of Education, spoke on "Some Basic Consideration in Planning the Physical Plant for Industrial Arts Teacher Education" after which a worth-while discussion followed.

The preliminary steps to organizing the American Association of Industrial Arts Supervisors were taken under the chairmanship of Merrill Hamburg.

After quite a lengthy discussion, a constitution was formulated. This was further discussed in the afternoon meeting and then adopted.

The dues were set at $5 per year. This includes also the dues to the American Industrial Arts Association.

Officers elected are: president, Merrill C. Hamburg, Detroit; vice-president, Kenneth Brown, Philadelphia, Pa.; and secretary-treasurer, Osborne Johnson, Denver, Colo.

A panel discussion was then held on the *duties* and responsibilities of the supervisor.

The first session of the convention on Thursday morning was presided over by R. Lee Hornbake, from the University of Maryland. It considered the problem of Industrial Arts and Industrialism.

Hector Lazo, director of public relations, Sunshine Biscuit Co., Long Island, N. Y., showed how far advanced the American workman's scale of living is above that of the workers in other countries.

R. W. Crary who was the next speaker held that the American educational system is good but it should be better and our students should leave

(Continued on page 6A)

Epsilon Pi Tau initiates, March 11, 1951. Phi Chapter at State Teachers College, Oswego, N. Y.

Seated, left to right: W. Welser, A Vita, J. Hartness, J. Nolfo, H. Hagglom
Standing, left to right: G. Forget, P. Chamberlin, R. Spring, A. Schilling, R. MacLogan, E. Pascuzzo, L. Robinson, R. Langebartel, R. Rulon

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ASSOCIATION NEWS

(Continued from page 4A)

us equipped with a better sense of civic responsibility.

Harvey K. Meyer, University of Florida, pointed out that we must develop more awareness of opportunity in this age of technics, and re-examine our content as well as the processes which we teach to the student.

At the second general session in the afternoon Lawrence C. Sechrest, State Teachers College, DeKalb, Ill., presided. William E. Warner, executive director of civil defense of Ohio, explained the need and method of civil defense.

Wayne E. Hughes, director, School and College Division, National Safety Council, Chicago, emphasized the need of developing a good accident reporting system, good safety environment, safety instructions based on safety reports findings, and an active class safety consciousness.

The Friday morning meeting pointed out the relationships between industrial arts and the community.

Kenneth W. Brown, assistant director of industrial arts at Philadelphia, was the chairman.

Leon Mones, principal, Cleveland Junior High School, Newark, N. J., was the main speaker.

In his address on "Industrial Arts and the American Community" he urged industrial-arts educators to fight the following clichés: (1) There is no education except in mental training. (2) Reading, writing, and arithmetic is necessary and sufficient for all. (3) Teach thinking abstractly. (4) Moral and spiritual values can be taught by preachment. (5) Child disciplines his will power merely by writing. (6) Knowledge is power. (7) Major and minor subjects. (8) Latin and mathematics are majors; industrial arts, music, etc., are minors. (9) Loyalty, freedom, etc., can be taught only by word of mouth. (10) Fine art is a noble subject while industrial art is only for the underprivileged, slower learners, and those who need to be disciplined.

Other speakers on this program were G. Wesley Ketcham, Robert L. Thompson, William T. Kelley, and William J. Wilkinson. Thoughts brought out by these men were: We must do more to emphasize health in the homes of our students; teach more about industry in our classes; bring fathers and mothers more often into our shops, and help our administrators to recognize the educational values of industrial arts.

Louis V. Newkirk was chairman of the Friday morning program on radio and television.

Robert Wade, manager, staging service, National Broadcasting Co., explained how television presentations should be planned and produced. He also showed how scenery for broadcasts can be made in units so that they can be adapted for many purposes. He also warned that objects to be seen should be at least 6 by 9, or 9 by 12 in., that shiny metal should not be used, and that the demonstrator should shave just before going on the stage to avoid 4 o'clock shadows at 11 in the morning.

The afternoon session on "Research and Experimental Programs" was presided over by John A. Whitesel, Miami University, Oxford, Ohio.

Elroy W. Bollinger, of the University of the State of New York, spoke on School Shop Planning and Florence B. Stratemeyer, Teachers College, Columbia University, gave an address on "Industrial Arts in a Curriculum for Modern Living."

Other speakers on this program were William E. Huss, Oswego, N. Y.; Bernard S. Proctor,

(Continued on page 12A)

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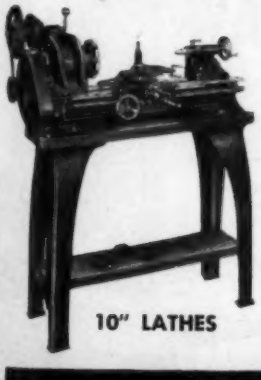

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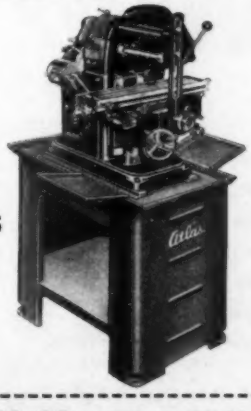

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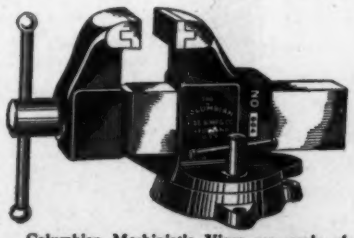

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INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

JUNE • • • • 1951

Preparation and Upgrading of Industrial-Education Personnel

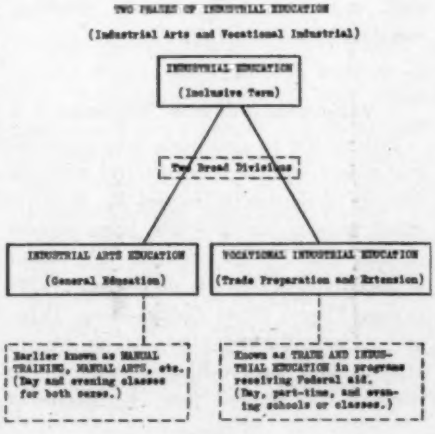
EINAR E. SIRO
Professor of Industrial Education and Head of the Department
Chico State College
Chico, Calif.

Education in the United States is currently and always subject to both favorable and adverse criticism, with emphasis often upon the latter, and this is a healthy circumstance for the schools of a democracy. We of the profession must continually evaluate and appraise our objectives, offerings, and practices. Worthy advances, in the whole and in the several parts or specialties, will depend upon acceptance of challenges, the discussion of issues, and the compiling of data in support of actions and as a guide to desirable changes.

The study* here emphasized was initiated to obtain a synoptic picture of the preparation and upgrading of industrial education personnel, and more specifically, industrial education teacher training as carried on by higher institutions of learning and by state departments of education or state boards for vocational education. It was not intended to deal extensively with details, but to picture, rather broadly, the past and present, and to predict in possible measure the future status of the field. Findings are assumed to be of value to special administrators, supervisors, co-ordinators, those engaged in the preparation and upgrading of teachers and other school workers in one curriculum area. Understanding and professional profit is assumed also for general educators and for individuals contemplating careers in industrial education.

The term *industrial arts,* as used in this study, refers to shopwork and drawing courses offered in elementary, junior high, and senior high schools and at college levels with the major objective of assisting in the general development of enrollees. It is an area of general education, recommended for all youth without regard to later earning plans. The term *vocational-industrial,* as used in this study, refers to shopwork and related subjects training which has as its major purpose the preparation of students for entrance to and for advancement in specific trades or occupations. *Industrial education* is a broader term, inclusive of both industrial arts and vocational-industrial training. The theme of this study comprehends the preparation and upgrading of instructors and other workers in both of the phases of industrial education. It concerns industrial-teacher training of varying types and under varying agencies, patterns, aids, and controls.

The data for this study, beyond intensive canvass of related literature and historical sources, were derived from the existing federal laws governing vocational education and by use of three separate mailings of questionnaires. One of the latter was sent to the chief state school officers (100 per cent return), one to institutions known to be and likely to be training industrial education teachers (76 per cent return), and one to the state industrial education departments through the state directors of vocational education (92 per cent return).


TWO PHASES OF INDUSTRIAL EDUCATION
(Industrial Arts and Vocational Industrial)
INDUSTRIAL EDUCATION
(Inclusive Term)
Two Broad Divisions
INDUSTRIAL ARTS EDUCATION
(General Education)
VOCATIONAL INDUSTRIAL EDUCATION
(Trade Preparation and Extension)
Earlier known as MANUAL TRAINING, MANUAL ARTS, etc. (Day and evening classes for both sexes.)
Known as TRADE AND INDUSTRIAL EDUCATION in programs receiving Federal aid. (Day, part-time, and evening schools or classes.)

Growth of the Field

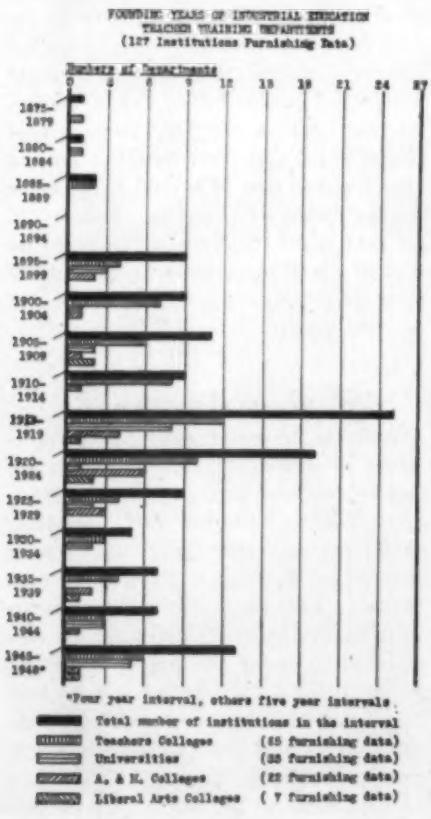
With the advent of the industrial revolution in America, industry's needs for trained workers increased. The existing apprenticeship methods for supplying skilled workers and the immigration of skilled workers from Europe did not suffice to meet these needs. The pressure of demands for aid thrust upon the educational leaders of the day by industrial groups brought the establishment of scattered trade schools, corporation schools, vestibule schools, and trade courses in public schools.

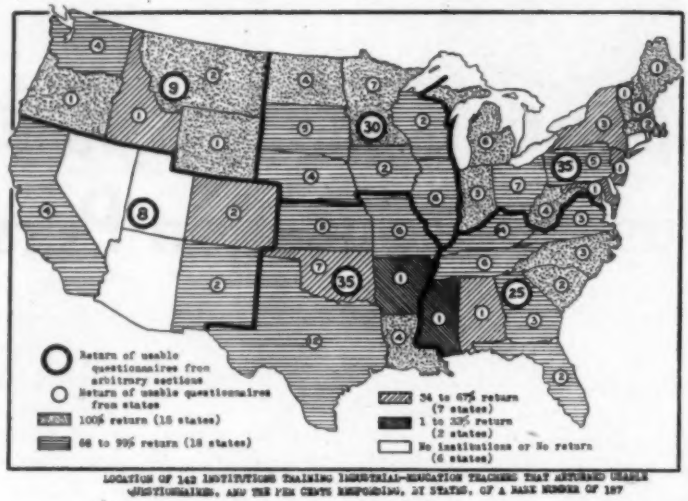
The work in the public schools was

*Einar E. Siro, "Preparation and Up-Grading of Industrial Education Personnel." Unpublished Ph.D. thesis, Graduate School, University of Minnesota, 1949, pp. xxi + 642. Major adviser: Dr. Homer J. Smith. An Intensive Report on the Plans and Activities of Four Types of Collegiate Institutions in Providing Industrial Arts and Vocational Industrial Personnel for American Public Schools, With Supporting Controls and Services of State Departments of Education. Origins, Objectives, Staffs, Students, Curriculums, Practices, Facilities, Placements, Relationships, and Anticipated Changes.

greatly influenced by the introduction in the late 1870's and early 1880's of, first, the Russian, and later, the Swedish systems of teaching handwork. One of the major issues of this period was the controversy as to whether the shopwork or industrial training in the public schools should be vocational in nature or a new and worthy part of general education. It slowly came to be generally agreed that there was a place for shop courses which contribute to the general education of students as well as for other courses which have specific trade preparatory functions. The general shop training in the public schools was first known as *manual training* in the 1880's, as *manual arts* in the 1890's, but in the next decade a movement was begun to change the name to *industrial arts*, the designation popular at the present.

The growth of shopwork occasioned a demand for trained teachers of these special subjects. The existing normal schools enlarged their offerings to supply those teachers necessary for the elementary level, but the first high school teachers were trained in existing trade schools without specific acquaintances with teaching methods or philosophy. The training of industrial education teachers, as we know it today, did not get under way until the latter part of the nineteenth and early part of the twentieth century. Special impetus was given to the growth of the program by the passage of the Smith-Hughes Act in 1917.




Return of usable questionnaires from arbitrary sections
Return of usable questionnaires from states
100% return (15 states)
66 to 99% return (18 states)
34 to 67% return (7 states)
1 to 33% return (2 states)
No institutions or No return (6 states)

LOCATION OF 142 INSTITUTIONS TRAINING INDUSTRIAL-EDUCATION TEACHERS THAT RETURNED USABLE QUESTIONNAIRES, AND THE PER CENTS RESPONDING, BY STATES, OF A BASE NUMBER OF 167

Industrial Arts Education

At the present time industrial-arts courses, designed to contribute to the general development of students, are offered in elementary schools, junior high schools, senior high schools, colleges, and in certain special schools and classes.

Respondents in the state departments of education favor the following grade placement of industrial arts: as an activity within another subject at the elementary school level, as required subjects in the junior high school (grades 7, 8, and 9) and in the tenth grade, and as elective subjects in the eleventh and twelfth grades of the senior high school and in the junior college. The most frequently taught industrial-arts subjects in the junior and senior high schools are woodwork, drafting, metalwork, and electricity.

Vocational-Industrial Education

Federal aid to vocational education below college level became effective with the passage of the Smith-Hughes Act in 1917, which continuing law has been supplemented by a series of term acts under approximate rulings: George-Reed, 1929; George Ellzey, 1934; George-Deen, 1936; and George-Barden, 1946. The Smith-Hughes and George-Barden Acts are in effect at the present time. Expansion of specific training for trades and allied occupational pursuits has been enormous. It involves not only the preparation of beginners but the constant adjustment of adult workers. Its objective is that of preparing students to enter or to advance in chosen fields of work. Courses are offered in day, evening, and part-time classes in many general schools as well as in public and private trade schools. This program in public vocational schools or classes receiving federal aid is known as *trade and industrial education*, and is supplemented by apprenticeship and corporation training arrangements.

Teacher Training Institutions — Numbers and Types

At the present time approximately 170 collegiate institutions in the United States are definitely known to be engaged in the preparation of industrial-education teachers. One hundred forty-two (84 per cent) of these institutions, the majority of which are state controlled, are included in the present study. These institutions are further grouped into four categories as follows: 72 (51 per cent) teachers colleges, 38 (27 per cent) universities, 23 (16 per cent) A. & M. colleges, and 9 (6 per cent) liberal arts colleges. The data received from these institutions have been presented according to these groups as well as by totals to facilitate comparisons.

Of the 142 institutions, 91 prepare industrial-arts teachers only, 4 prepare vocational-industrial teachers only, and 47 prepare both types of industrial teachers and other school workers. The five top-

ranking objectives of the departments training industrial-arts teachers only are:

1. To train teachers of industrial arts for public school service
2. To provide pretechnical training for other professions
3. To assist with the in-service training of teachers
4. To develop proper appreciation of the significance of industrial arts for its contribution to present-day living
5. To provide courses for majors from other departments

The five top-ranking objectives of departments training both industrial arts and vocational industrial teachers are:

1. To train teachers of vocational-industrial education
2. To train teachers of industrial arts for public school service
3. To provide pretechnical training for other professions
4. To assist with the in-service training of teachers
5. To train administrators, directors, supervisors, co-ordinators

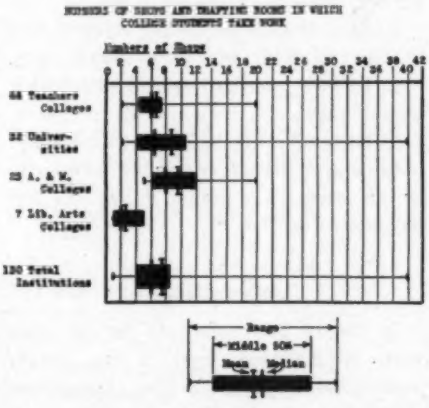
Enrollments and Facilities

The median teachers college included here is located in a town of 12,000 population, has a total school enrollment of 1025, and has 144 students in the industrial-education department. The median teachers college provides 6 shops and drafting rooms in which students may take work. These shops are most frequently housed in separate buildings and are under direct control of the industrial education departments. Such departments are most commonly known as the industrial-arts department and are most frequently divisions or parts of the institutions.

The median university dealt with is located in a town of 40,000 population, has a total school enrollment of 5200 students, and has 115 students in the industrial-education department. It provides 6.5 shops and drafting rooms in which students may take work. In one half of the universities these shops are most frequently housed in buildings shared with other departments yet under direct control of the special department. In the other half of the universities the shops are not under direct departmental control. These departments are most commonly known as departments of industrial education, and are most frequently parts of the school or college of education.

The median A. & M. college is located in a town of 10,097 population, has a total school enrollment of 1950 students, and has 116 students in the industrial-education department. The median A. & M. college provides 8 shops and drafting rooms in which students may take work. These shops are most frequently housed in buildings shared with other departments and not under special department control. These departments are most commonly known as industrial-education departments, and are most frequently attached to engineering divisions or schools.

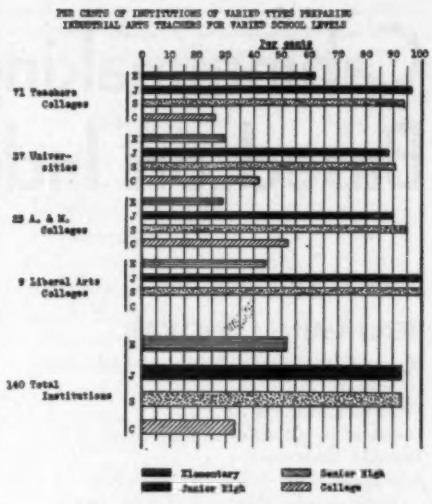
The median liberal-arts college dealt with is located in a town of 8000 population, has a total school enrollment of 750, and has 100 students in the industrial-education department. The median liberal arts college provides two shops and drafting rooms in which students take work. These shops are most frequently housed in separate buildings under direct departmental control. These departments are most commonly known as the industrial arts department and, in all nine of the liberal arts colleges, are attached to different parts or divisions.



Nature of Work

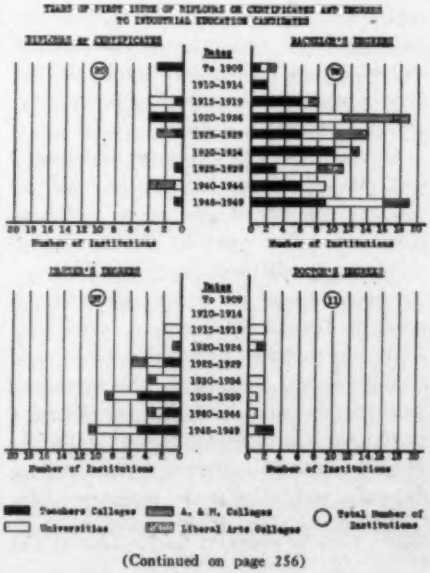
The training institutions are preparing most of the industrial-arts teachers for the public junior and senior high schools and most of the vocational industrial teachers, the majority of which are trained by the universities and A. & M. colleges, for public vocational schools and classes.

Of the 142 schools included in this study 43 per cent now offer master's degrees and 26 per cent desire to offer master's degrees. Nine per cent of the institutions offer doctor's degrees and 5 per cent desire to offer this degree.



Approximately three fifths of the institutions operate on the semester basis. Approximately one half of them have one summer term and the other half two or more terms. Only one institution reported no summer term. The eight-week summer term is most popular among schools with single session. Six-week terms are most popular with schools having two terms.

Participants in training institutions indicated that their programs are affected most favorably by the following three groups of circumstances: (1) state certification requirements, (2) demands for teachers with special training, and (3) activities of state industrial-arts personnel. Their work is impeded most by (1) general school curriculum committees, (2) attitudes of other departments in the schools, and (3) major-minor requirements.



(Continued on page 256)

Cabinetmaking Instruction Based on Industrial Needs*

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Philadelphia, Pa.
Lecturer in Vocational Education
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Senior High School
Decatur, Ill.

No vocational course in cabinetmaking can be practical or successful if it fails to recognize industrial needs. Contact between shop and school must be close and sustained if instruction is to remain up to date and efficient.

Modern cabinetmaking is far different from the traditional hand furniture making of bygone years. The industry is much more specialized, and machine processes have replaced many of the older hand operations. Present-day establishments may be large and employ hundreds of individuals on various skill levels, or they may be small jobbing shops which employ very few workmen.

Although the cabinetmaking industry is well established in Decatur, Ill., the vocational cabinetmaking course has been given but a few years in the high school of that city. Hitherto no careful survey has been made of the equipment and practices of the local shops. A systematic study was therefore undertaken of 13 local establishments. The shops visited produce finished products chiefly of the following types: kitchen cabinets, general millwork, window and door frames, screens, store fixtures, and laboratory furniture. Machine work figures prominently in the manufacturing processes.

As an aid to obtaining data during the interview, four check sheets were utilized. Their content covered the following:

1. Types of goods manufactured, machines used, and machines the entry worker would be permitted to use.
2. Jobs the entry worker is permitted to do, and skills which he should have.
3. Related information the entry worker should know.
4. Personal characteristics of the worker.

An entry worker is defined arbitrarily in this study as a worker during his first six months on the job.

The Findings

In the 13 establishments visited, there were 40 machines used in the regular manufacturing program. The 17 machines most commonly found are listed in Table 1. The table shows also the number of shops permitting the use of these machines by the entry worker.

TABLE 1. Machines Found in Establishments Compared With Use by the Entry Worker

Machines Used	*No. of Establishments Using*	*Operated by Entry Worker*
1. Hand clamps	13	11
2. Jointer	12	8
3. Band saw	12	8
4. Circular cutoff saw	12	9
5. Drill press	11	10
6. Planer	11	7
7. Shaper	11	4
8. Glue rack	10	8
9. Hollow chisel mortiser	9	8
10. Belt sander	9	8
11. Swing cutoff saw	8	4
12. Jig saw	8	6
13. Wood lathe	8	3
14. Circular ripsaw	7	4
15. Glue heater	7	5
16. Universal saw	6	2
17. Disk sander	6	4

On the basis of the findings shown in Table 1, the well-equipped school shop should have the 17 machines indicated. In most of the shops the lathe is used only part of the time, depending of course upon the type and volume of work. Frequently the lathe operations are performed by a few specializing persons in the shop.

Table 2 shows the jobs which the entry worker is permitted most frequently to perform in the 13 establishments.

TABLE 2. Jobs Entry Worker Is Permitted to Do in 13 Establishments

Jobs	*No. Establishments Permitting*
1. Sanding	7
2. Gluing	7
3. Assembly of parts	5
4. Off bearing	4
5. Helper	4
6. Clean floors	3
7. Mortising	2
8. Care of supplies	2
9. Get out stock	2
10. Use drill press	2

Since most of the establishments were large, little importance was placed on cleaning floors, care of supplies, checking material, and getting out stock as jobs for entry workers. These duties are performed by especially designated personnel.

The hand skills which the entry worker should have, according to the industries analyzed are shown in Table 3. The total number of skills mentioned was 46. Only those most frequently mentioned are included in the table.

Not shown on the table because of limited importance were skills in finishing and in fitting hardware. The prevailing union requirement is that finishing processes be done in a specialty shop. The fitting of hinges, locks, and ball catches is entrusted usually to the experienced mechanic.

The machine skills which industry

*From "Cabinet Making Based Upon Industrial Needs." Master's Report by Wendell K. Davis. Colorado A. & M. College.

TABLE 3. Hand Skills Desired of Entry Workers by 13 Establishments

Skill	No. Establishments
1. Measure and divide spaces with rule	11
2. Drive and draw nails	11
3. Set nail or brad	11
4. Make edge to edge joint	11
5. Test for squareness with square	10
6. Sharpen tools: knives, chisels, plane bits	10
7. Prepare glue	10
8. Glue up work	10
9. Hold stock with hand screws and clamps	10
10. Check material when received	9
11. Adjust jack or smooth plane	9
12. Read a working drawing	8
13. Lay out pattern on stock	7
14. Set and use expansive bit	6
15. Gauge with pencil	5
16. Lay out and cut chamfer	5
17. Make dowel joint	5
18. Fasten on table top	5

thought should be mastered by the entry worker are shown in Table 4. Twenty-seven separate skills were mentioned. The twenty most frequently named are tabulated.

TABLE 4. Machine Skills Desired of Entry Workers by 13 Establishments

Skill	No. Establishments
1. Circular saw — rip	10
2. Sander — flat work	10
3. Jointer — care and adjustment	9
4. Jointer — joint and edge	9
5. Circular saw — cutoff	9
6. Circular saw — care and adjustment	8
7. Band saw — curves	8
8. Planer — adjust for depth of cut	7
9. Sander — care and adjustment	7
10. Jointer — cut rabbet	5
11. Band saw — care and adjustment	5
12. Circular saw — cut grooves	4
13. Circular saw — cut dadoes	4
14. Circular saw — cut tenons	4
15. Circular saw — cut miters	4
16. Planer — care and adjustment	4
17. Sander — curved worker	4
18. Mortiser — care and adjustment	4
19. Lathe — center stock	4
20. Lathe — rough down with gouge	4

The technical information considered necessary to be known by entry workers is shown in Table 5. Twenty-nine items were mentioned, of which the 22 most frequently named are recorded below.

Knowledge of finishes and information on hardware were considered to be of very limited importance by the cabinetmaking establishments.

TABLE 5. Technical Information Required of the Entry Worker by 13 Establishments

Item	No. Establishments
1. Lumber — identification	11
2. Lumber — nominal and actual dimensions	11
3. Glue — types	11
4. Sandpaper — kinds and grades	11
5. Joints — types and where used	11
6. Tools and uses (saws, planes, knives, chisels, hammers, boring tools, files)	11
7. Lumber — standard dimensions and classification	10
8. Nails — kinds	10
9. Nails — uses	10
10. Lumber — effects of moisture	9
11. Nails — how sold	9
12. Screws — kinds	9
13. Stones — kinds, grades, uses of grinding and sharpening	9
14. Lumber — board measure and other applied mathematics	8
15. Nails — sizes	8
16. Glue — preparation	8
17. Lumber — characteristics, working properties, uses	7
18. Lumber — methods of cutting and milling	7
19. Lumber — methods of drying	7
20. Screws — uses of different kinds	7
21. Screws — indicating sizes and kinds	6
22. Sandpaper — principal uses	6

The employers finally were questioned regarding the personal characteristics desired in entry workers. There were 28 items which were graded as to importance. One of the four grades could be assigned: A. Required to a very high degree. B. Required to a degree above average. C. Required to a degree less than average. D. Not required. Table 6 records only the items given an appreciable number of very high ratings. Only 20 of the highest ranking items are tabulated.

It is apparent in Table 6 that dexterity and co-ordination appear repeatedly in a variety of forms. Thus items 1, 4, 9, 11, and 14 are all related. The emphasis is heavy upon job performance skills. Items such as personal appearance were rated low. The emphasis of the study was so much upon skills that it is possible that these aspects were to some degree overlooked.

TABLE 6. Personal Characteristics Desired in Entry Worker by 13 Woodworking Establishments

Characteristics	No. Employers Ranking Very High
1. Eye-hand co-ordination	10
2. Keenness of vision	9
3. Memory for details	9
4. Finger dexterity	8
5. Memory — oral direction	8
6. Memory — written direction	8
7. Arithmetic computation	8
8. Initiative	8
9. Dexterity — hand and arm	7
10. Touch discrimination	7
11. Co-ordination of both hands	6
12. Ability to plan	6
13. Adaptability	5
14. Foot-hand-eye co-ordination	4
15. Estimate speed — moving objects	4
16. Keenness of hearing	4
17. Intelligence	4
18. Oral expression	4
19. Personal appearance	4
20. Estimate quality of objects	4

Application of Findings

The survey findings and a review of other studies indicate that learners in vocational cabinetmaking courses should be selected. Among the factors to be considered are: intelligence, aptitudes, health and physique, interests, and hobbies. These can be ascertained by tryout, interview, tests, and review of previous school records.

Once the applicant has been admitted to the course, there should be taught efficient vocational skills. Accompanying personal qualities to be developed are: loyalty, responsibility, punctuality, personal neatness, thrift, consideration for others, and good work habits.

The machines needed for a well-equipped school shop are the 17 listed in Table 1.

Instructional units are developed in conjunction with the following basic live jobs: (1) screens, (2) storm windows, (3) storm doors, (4) bookcases, (5) utility cabinets, (6) upper kitchen cabinets, (7) base kitchen cabinets, (8) china cabinets.

The live jobs can be accepted from the outside, or used for the houses that may be constructed by the building trades classes of the high school. Additional

(Continued on page 256)

Leaders in Industrial Education

WILLIAM T. BAWDEN
Office of Publications
Kansas State Teachers College
Pittsburg, Kans.

(Continued from page 201 of the May, 1951, issue)

ARTHUR DAVIS DEAN (Concluded)

The Wasted Years

One chapter is devoted to a study of women in the home, in industry, and in business. Another deals with the so-called "wasted years" in the lives of boys and girls, so many of whom were dropping out of school at the earliest opportunity permitted under compulsory school attendance laws — 12 to 14 years at that period, in those states which had enacted laws on the subject. Neither the children nor their parents believed that it was worthwhile to continue in school.

Finding no work opportunities open to them except the casual, unprofitable, and unpromising "juvenile" occupations, leading to nothing of consequence, these young people were destined to be rudely awakened in a few years to the realization that they had arrived at adulthood, with its newly aroused desires, claims, ambitions, and responsibilities, but without preparation for any sort of adult employment, and entirely lacking in marketable skills or knowledge.

One of the major contributions of the book was the discussion of those phases of a program of vocational education then beginning to engage the attention of the public, but concerning which very limited information was available, and hence widespread curiosity: trade schools, the co-operative school, and schools maintained in factories, shops, and mills. One chapter was devoted to a discussion of needed supplemental education in its relation to industry, and the final chapter consisted of a declaration of principles.

Three brief, unrelated quotations may be cited, to suggest something of the author's style:

"In many communities there is fear of making a beginning, the fact being lost sight of that the best in our education has developed out of pedagogical experience and not out of mere discussion" (page 21).

"The history of industry is the history of civilization, and the progress of mankind is written in the history of its tools." (page 25).

"One of these days the whole nation will be led to see that in the haste of our marvelously successful industrial development we have lost sight of the fact that in the new industrial order which we have evolved we have left no place for a broad and adequate training for our industrial workers, and unless we provide that training we will suddenly find our whole industrial structure standing on an insecure foundation" (page 159).

A Landmark

While the value of this book today is chiefly historical, it must be accounted a major contribution to educational thought and practice at the time of its appearance. Himself a graduate of one of the pioneer manual training high schools, and a teacher of shopwork and drafting in elementary and secondary schools, Dean profited greatly by his experience as assistant principal of the newly organized Technical High School in Springfield, Mass., where he was in charge of the mechanic-arts department. Following this with two years of experience as supervisor of evening trade schools in Massachusetts and Rhode Island, he emerged as one of the outstanding leaders of industrial education of the country.

He was so recognized, and it is not surprising that he should have been inspired to write the book which proved to be a landmark in the movement for vocational education for at least two or three decades. It was published during his second year as chief of the division of vocational schools in the State Department of Education, Albany, N. Y., which from that day has been generally regarded as the foremost organization of its type in the country.

Just Between Ourselves

The other book, of which I wish to try to give some account in brief compass, is of an entirely different sort.[2] A majority of the chapters in this book appeared originally as editorials or contributed articles in the *Manual Training Magazine* and later, *Industrial Education Magazine*. In book form they were published under the subtitle, "Practical Talks to Industrial and Vocational Teachers."

One glimpse into the character of his "talks to teachers" is afforded by a random quotation: "Those teachers who read nothing, never visit schools, attend no conventions, and join no professional societies will always wonder why the other fellow gets ahead."

In a series of three chapters, "Educational Table D'Hôte," "À-La-Carte Educational Service," and "Cafeteria Education," with keen wit, and characteristically penetrating analysis, he likened the traditional system of more or less rigidly prescribed academic education to the "table d'hôte" meal service of that day. Then came the elective system, carried to extremes in so many instances, which he likened to "à-la-carte" educational service. In the third chapter he discussed the advantages of what he called "cafeteria" education.

[2]Arthur D. Dean, *Just Between Ourselves* (Peoria, Ill.: The Manual Arts Press, 1925), cloth, 208 pp.; out of print.

"I want my 'car-barn' education in factories, stores, and offices so as to catch the workers while they are on the job. I want my 'railroad-station' education to catch the person who is about to enter industry or commerce through the vestibule schools, or to catch him for a readjustment in his vocational pursuit. I want my 'businessmen's' schools for trades and professions. I want my 'French pastry' education for those with leisure, and 'waffles' for those who know not yet what they want and have time enough to decide over the teacups. But most of all I want my *cafeterias* for those who need quick and comprehensive educational service.

"Imagine an educational self-service. It has electric signs for night schools. It is located where people work and recreate. It has a printed menu and suggestions for educational diets — for those with mental hardening of the arteries and vocational Bright's disease as well as for those who have occupational hay fever. It employs a good vocational guider who assists in choosing menus. It has its food temptingly displayed and no academic mysteries about its preparation. It has food that costs from ten cents worth of time to $1 worth of effort. . . . It has its club breakfast combinations, and its six o'clock season of service as well. It reduces heavy overhead by serving many people at certain hours and fewer people at all hours between. . . .

"I should like to see such an educational venture, one which is as catholic as the cathedral, as popular as a motion picture house, as serviceable as a public library, and as democratic as a street car."

The final chapter in the book is entitled, "Just a Prophecy." It was written in 1917, as he was leaving the State Department of Education, in Albany, to go to Washington, to take charge of the rehabilitation program in the hospitals of the U. S. Army.

"I am frankly puzzled by several things and it is of these that I would speak.

"In the first place, what are we going to do with our compulsory continuation schools for youth between 14 and 16? At present, they are very unsatisfactory (exceptions of course). Pupils do not like to attend them. Teachers are not prepared to teach in them. Correlation of work day experience with school work is difficult. . . . My prophecy is that the idea will be put on the scrap heap inside of five years. In its place will be compulsory full-time attendance up to 16 years of age." He then gives somewhat in detail his reasons for believing that some plan must be developed that will be more effective and more satisfactory all around than the part-time continuation school for employed boys and girls of ages 14 to 16 years.

In somewhat similar vein he discusses the junior high school of his day, surveys, tests, and vocational guidance, and causes the reader to think more deeply about the underlying philosophy, the glib claims, and the actual outcome of certain activities which he may have fallen into the habit of taking for granted.

Appointment at Teachers College

To return to the chronology of Dr. Dean's professional career, we note that he left his position as director of vocational education in the State Department of Education, Albany, N. Y., to accept a call to military service, in charge of reconstruction work in the U. S. Army hospitals. He served in this capacity for two years, 1917–19, with the rank of major.

Following the close of the war, he was appointed professor of vocational education in Teachers College, Columbia University, New York, where he remained for five years, 1919–24.

Newspaper Syndicate Features

During the period of his connection with Teachers College, Dr. Dean became interested in the proposal to do something about the pressing problems of the guidance of youth to which for years he had given much study. Early in the 1920's, after considerable experiment, he began writing a series of short sketches, entitled, "Your Boy and Your Girl." It was accepted by one of the New York daily papers and achieved a measure of success almost from the beginning.

Each installment discussed some youth problem, and invited readers to write for more personal attention to individual problems. The resulting correspondence soon reached sizable proportions. One of Dean's newspaper friends suggested application to one of the syndicates, and in time the feature was appearing in a chain of daily papers.

Soon after the first feature was well established, Dean started a second, which he entitled, "Let's Talk it Over." In a relatively short time the correspondence created by the two features increased to a point at which Dean was obliged to rent an office and employ a staff of clerks to assist in keeping up with the flood of letters and inquiries. Instructions to readers required them to address their inquiries in care of the local paper in which the feature story appeared. This plan meant that the managing editor of every individual paper in which the syndicated articles appeared knew directly something of their drawing power.

I remember attending one of the major conventions in Atlantic City, I think about 1928 or 1929, at which I had a long visit with Dr. Dean. Among other things he talked about the two syndicated features, which were being carried by more than 100 daily newspapers — I do not recall the exact number. At that time he had a staff of five employees working full time in his New York office.

In 1924, Dean resigned his position at Teachers College to give his full time to writing.

For some reason, which I could never fully account for or explain, I formed the opinion at the time that Dean's term of service at Teachers College was something of an anticlimax in his educational career. At least this seemed to be so with reference to his position as a national leader in industrial education. As I look back over the years, I am of the opinion that his influence as a leader was greater and more pronounced, and his advice and counsel were more sought after, during the period of his connection with the New York State Department of Education, 1908–17, than it was during the later period at Teachers College, 1919–24. This observation might be explained in part by the fact that there was more competition at the later period — a rapidly increasing number of leaders, of higher attainments and greater stature than before, made it increasingly difficult for any single one to achieve outstanding eminence. On the other hand, it may well be that I was entirely mistaken in my analysis of the situation.

Other Activities

Arthur Dean was a versatile character, and, in addition to the activities already noted, he was associated with a number of other undertakings which should be noted.

In 1908, with the support of the National Society for the Promotion of Industrial Education, he conducted an investigation of working conditions, including apprenticeship and opportunities for the training of workers, in the shoe manufacturing industry. He co-ordinated the efforts of a staff of investigators and writers, and edited the report of the survey in a bulletin published by the Society.

At about the same time he assisted in a comprehensive study of apprenticeship in the United States, the report of which was published as a bulletin by the U. S. Bureau of Education, in 1907. Dean was coauthor of the bulletin with Carroll D. Wright.

In 1919, he was director of a survey of conditions in the prisons of New York State, conducted by the New York State Prison Survey Commission, under an appropriation made by the state legislature.

He was active in the councils and on the programs of the National Society for the Promotion of Industrial Education and its successor, the National Society for Vocational Education, the New York School Crafts Club, the Eastern Arts Association, formerly the Eastern Art and Manual Training Teachers Association, and served as president of the latter for one term, 1911.

He served as a member of the board of directors of the Child Welfare Association, New York, for 22 years, 1924–46.

He was lecturer on vocational education in the summer sessions at the University of California, Berkeley, 1919, 1923, 1924.

In 1942–43, he served as consultant to the U. S. Civilian Defense Administration, assigned to the State Forestry Service, Hartford, Conn.

Personal Contacts

My personal contacts with Dr. Dean can hardly be described as intimate, although they were rather frequent and extended over a number of years. They included meetings at conventions and a considerable correspondence.

We first met at a convention of the old Eastern Manual Training Teachers Association in Cleveland, Ohio, in April, 1900, during the period of the development of the Technical High School at Springfield, Mass., of which he was assistant principal and director of the technical department. He was very approachable and easy to get acquainted with.

He was tall, close to six feet in height, and probably weighed around 180 to 190 pounds. I remember him as a dynamic personality, with an impressive air. He wore a full beard, which was somewhat more common in those days. He would not be properly described as an orator or spellbinder, but he could be direct and convincing. I never knew him to be long-winded; his remarks were generally condensed, terse, and to the point, and unmistakable in meaning. I have heard him speak with considerable force and vigor, not to say fire, when he was stirred up about something.

He was distinctly gregarious and generally the center of an animated group in the lobby of the hotel or the convention hall. He also had a well-cultivated sense of humor, and always had a story appropriate to the occasion.

Dean was one of the leading figures in the series of conferences held on Staten Island, N. Y., in 1913, 1914, and 1915, under the auspices of the National Society for the Promotion of Industrial Education. A small group of state and city directors met here for intensive study of problems of organization, administration, legislation, curriculum construction, and the training of teachers, during the period of agitation for legislation for federal aid to vocational education. These four-day periods of close association and co-operative effort not only contributed materially to laying the groundwork for the national movement for vocational education, but cemented ties of friendship, good will, and mutual understanding and respect which have endured through the years.

One means taken by Dean to extend his acquaintance among the leaders and others who were doing things was frequent attendance at conventions. He not only took conventions seriously himself, but urged their importance on young teachers. In 1922, he contributed an editorial, "On Going to Conventions," for the benefit of young teachers, and especially for the "old fellow" who is inclined to say, "What's the use? I can read the stuff in the report." A brief quotation, slightly condensed, will serve not only to show the point he was making, but also to illustrate his direct, pungent, and forceful style.

"1. Go to at least one important convention each year. Plan for it and make it a job not a junket.

"2. Take your choice between staying at a good hotel and eating around the corner, or sleeping around the corner and holding down a chair in a good hotel.

"3. Spend all the time possible in the lobby before a meeting and after it. Go to the movies at home. Time is too precious at conventions to waste it.

"4. At meetings either sit up front where you can hear or at the back where you can see. . . . Better, sit at one side near the front to see the audience as well as the speaker. Both are psychological studies.

"5. Take part in the discussion. Speak clearly. Remember that it takes experience and training to say something in five minutes.

"6. If you do not know one of the big men, introduce yourself. He may be more cordial than the little fellows."

Among other opportunities for personal contacts I recall a number of visits with Dr. Dean (Major Dean) in Washington, during the period when he was in charge of rehabilitation work in the U. S. Army hospitals, 1917–19. I do not remember any details of the problems and difficulties with which he was obliged to contend, but I do remember listening on several occasions to his salty, sometimes mildly profane, comments on the futility and inanity of government, and especially army, red tape.

Conclusion

In conclusion, Arthur Dean should be remembered with gratitude and respect for the interest he took in young teachers, and his constant attitude of helpfulness to them; for his vigorous and pioneering leadership in establishing a highly efficient state system of vocational education, with a sane and constructive relationship to general education industrial arts; for his contribution to the development of high ideals and aspirations through his activities in professional organizations of teachers; and finally for his writings, voluminous, comprehensive, and constructive, which, at a critical period in the evolution of thought and practice, constituted an important factor in the heritage which has been bequeathed to us.

Co-ordinating Physics With Industrial Education

C. L. RICH
Associate Professor of Physics
The Stout Institute
Menomonie, Wis.

Four courses in physics are at present being offered at The Stout Institute. The first course, Physics I, covers electricity and magnetism, heat, and mechanics. This is the only course in physics required. The others, Physics II, Physics III, and Physics IV, are elective. Physics II covers sound and light. Physics III is an intensive course on "strength of materials and materials of construction." Physics IV is a course in "electronics." Physics I grants 5 semester hours of credit to the student, while each of the other three courses grant the student 3 semester hours of credit.

It is the purpose of this article to point out special features of co-ordination of the physics courses with industrial education, keeping in mind that these courses must also function well in relation to general education. To delimit the article, the writer uses the Physics I course, and more especially the laboratory work of Physics I.

The Physics Course

For our Physics I (5 semester hours), we have 3 one-hour lecture-recitation periods, and 2 two-hour laboratory periods each week. At all times the work of the lecture-recitation period is closely co-ordinated with that of the laboratory. A test on the work for each laboratory period is given at the beginning of the following laboratory period. This, we find, keeps the students *on their toes.*

Inasmuch as The Stout Institute is a college of industrial education, we must not only be certain that our courses in physics contribute to industrial education in the best manner possible, but we must also develop the work in physics as a whole so that each course may receive its proper transfer credit from one college to another. Therefore, we really give an extensive course, as well as an intensive course, in many parts. Most of the credit for building up this department goes to Harry Good, and Professor F. E. Tustison.

The procedure for the lecture recitation period is much the same as that used in most of the smaller colleges, i.e., sound, clear explanations, with actual demonstrations where possible, full discussions, and many quizzes — preferably written. It is our laboratory work, however, which differs much from that usually found in the small colleges, or even in the universities. Hence, it is this part of the work which the writer will take up somewhat in detail.

For many of our experiments, we have enough apparatus and material so that each student may work individually. For most of the other experiments, we have enough apparatus and material for each group of two. As an example of the special practical aspect of the experiments in electricity, our students individually wire up and run small electric motors; take actual measurement of, and make calculations for, resistances; actually construct electrical heating units; make and charge storage cells; and construct small transformers and induction coils. These experiments tie up well with the work in industrial education. For spectacular work, such as operation of the Tesla coil, two students are assigned to perform the experiment as a demonstration.

Physics Laboratory Work

As an example of our experiments in heat, each group of two students construct and operate thermostats and thermostatic controls, construct and operate a hot water supply tank, and construct and operate steam heating and hot water heating apparatus. Each group of two uses a pressure cooker, thermos bottles, and other types of cooking utensils. Each individual student tests actual samples of all of the various types of insulation. Two students demonstrate actual radiant heating by the use of a panel of radiant glass heated by electrical energy. In addition, in the work of heat, the students make a field trip to view other latest heating devices and apparatus in operation.

As samples of experiments in mechanics, we place a vernier caliper in the hands of each student, and teach him how to use it. We have each student construct an actual cardboard vernier caliper. We have various types of apparatus in the study of vectors, using both the parallelogram method and the triangle method. Then the students actually measure and calculate tensile strength and the relationship of stress to strain for various pieces of material. They measure the flexure of beams, and calculate results. We have them take the actual breaking strength of beams of different materials and study the lever and its applications to various types of machines. We have them calculate specific gravity of various materials, and construct siphons and explain how they operate. Then they study the principal laws of the gyroscope by using an actual gyroscope. We also have the student study rotational motion through actual participation. For instance, we have a rotating platform. A student stands on this platform with heavy weights in his hands, and with arms extended. Then the platform is rotated, and the student is asked to bring his arms to his sides. The student is tremendously surprised to find that he begins to spin so rapidly that he cannot remain on the platform.

In summary, our students go a long way in learning construction and assembly procedures, principles and theory of actions involved, and then making the correct deductions — this, by actual participation in the laboratory. Hence, in the lecture-recitation periods, the students not only understand the work far better than they would have otherwise, but they also proceed further and *deeper* in understanding and applying the laws of physics.

Industrial Arts and Vocational Education
John J. Metz, *Editor*

WILL THE SELFISH HELP US REGAIN OUR PEACE?

It has been said that there are but two classes of people in the world, those who live to get what they can by fair means or foul, and those who are anxious to give so that others may live better and happier lives.

The first class contains the trouble-makers of the earth. It is they who create distrust between members of families, between groups of workers, between employers and employees, and even between nations.

We have examples of these kind of people in large numbers right now. The communist leaders have no pride of country in their hearts. They merely recognize their own desires and ambitions, and to satisfy them, they are quite willing to reduce their own countrymen to the level of beasts of burden, just so they can gain wealth and power for themselves. They are willing to lie and betray their best friends — friends who have helped them when they were in serious straits, almost ready to be annihilated. The communists are doing that now and they were slyly trying to undermine our government even when we were furnishing arms, and food, and clothing so that they could save their own country.

Other nations that professed great love for us when they were in danger, are almost as bad as the communists for they expect our soldiers to do the major part of the fighting in Korea, while they sell arms, ammunition, and machine tools to our enemies. What makes their perfidy still worse is that the materials which they are selling to our enemy were produced with lend-lease money obtained from us, and which, judging from past experiences, will never be repaid. What is still worse, these governments do not hesitate to sacrifice their own countrymen to satisfy their ambitions, for, small as their contingents of soldiers are in Korea, nevertheless, their armies are fighting against communist forces to whom the folks at home have sold the wherewithal to slaughter them on the field of battle. It is hard to understand such conditions, but the aim to cheat, to lie, to acquire power, and to get it no matter how, so blinds some of the world's leaders that they are ready to sacrifice everything to gain their nefarious ends.

On the other hand, there are those who "live to give." The men and women who, with altruistic love, are willing to give their money and their energies to help those who are less fortunate than they. In your own communities they are the boy and girl scout leaders who spend hours of their own time to lead boys and girls so that they may develop the right kinds of characters. They are the missionaries who go into foreign lands to christianize savages who not infrequently slay them. They are the Damiens who take care of lepers and other unfortunates who are not taken care of by those whose duty it really is to care for them.

If peace is to come to this world again, which of these two groups will have brought it back to us? Can we picture this clearly to our students? Can we develop our own personalities so that we will become less of the *give me* and more of the *give to others* kind? Can we do more to help our students see the need of altruism? Does peace really mean that much to us?

SAFETY HINTS FOR VACATIONERS

Naturally every teacher is interested not only in his own students but in boys and girls in general. He knows quite well that vacation time takes a severe toll on the lives of youngsters every year. Many of the fatalities and the accidents that happen are due to carelessness and foolhardiness. It is well then to impress the students that caution must be used and safety hints observed so that vacation time may be truly happy and joyous.

Discuss then with your pupils before they leave to go out on their own for the summer, the dangers that are met with on the highways, at the camps, in the country, on rivers and lakes, and the dangers encountered when eating unknown berries and fruits, or drinking the water taken from rivers and lakes.

Warn them of the accidents that may happen to those who climb trees, houses under construction, or walking over or climbing around on railroad trestles and the like. A discussion carried out on the conference plan with your students on vacation accidents may be means of saving the lives of some of your boys. Try out this plan — it is worth while.

HOW ABOUT THE FINAL EXAMINATION?

The fact that shop teachers will shortly have to determine what grades are to be given to their students for the school year which is now approaching its end, brings up the question of tests and final examinations.

Whether or not the teacher is in full accord with the types of tests now so commonly used, it is quite evident that some definite measuring device must be used to determine whether the teacher has succeeded in putting across what he set out to teach his students. It should not discourage him if he is not satisfied with the tests used in the past. As a matter of fact, that kind of feeling, far from discouraging him, should urge him to try to improve his tests. If all shop teachers would do this, it would not take long before better tests and testing methods would be available.

It is only by continual improvement that perfection can be approached. Make use then of what we have now, even if it is imperfect. For assistance in preparing your own test make use freely of what other teachers have offered in the way of tests and examinations in past issues of this magazine. And do not forget to pass on good tests that you may devise, so that all your co-workers in the teaching profession may profit from your efforts as you are now, or have in the past, profited by the labor of others.

PLEASE TAKE NOTICE

Are you going to have a new address for the school year 1951–52?

If so, kindly send us your new address and your zone number together with your former address, and let us have this information no later than August 15.

We will not be able to replace misdirected September issues. INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is not published between May 15 and Aug. 15.

Stephen Girard and His College

SYDE FRIEDMAN
New York City, N. Y.

The world has often honored great philanthropists, but on May 20, 1950, the many thousands of foster sons of Stephen Girard will celebrate the bicentennial birthday of this outstanding humanitarian and public benefactor, who attained fullness of life by wedding personal achievement to public service. The orphan students and alumni of Girard College will extol and glorify the name of Stephen Girard, a rare and unusual individual. During his lifetime he contributed his benevolent exertions in the cause of suffering humanity, and after his death in 1831, this multimillionaire was adjudged the richest citizen in this country, and one of the most fabulous figures in American history. In his hands was the touch of Midas, everything was turned into gold; and fruits, flowers, vegetables, ships, houses, lots, bank and all, contributed in the end to pour millions into his lap.

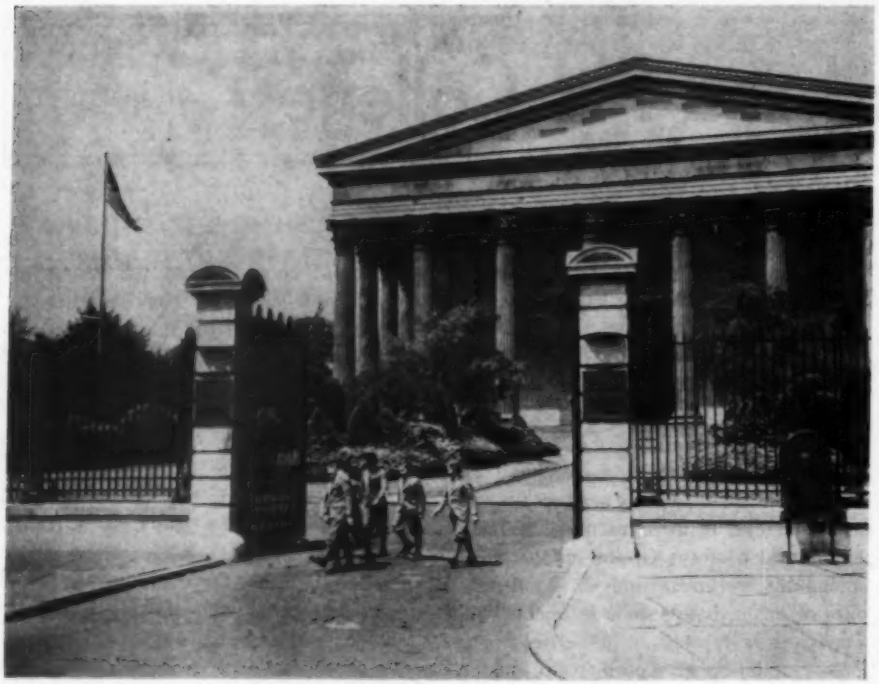
Although Girard was born in a suburb of Bordeaux, France, he gained success and fortune while residing in Philadelphia for over 55 years. He was a very lonely man, conducted his life only with business and was a great altruist and humanitarian. His wife went insane when he was only 40 years of age, and was left childless; and it is believed that is why he left his fortune to help the boys he never had. He was known to be an industrious and frugal man, and with all his wealth he practiced plain living. Hard work was a fetish with him and he often remarked "my work is my life." In fact, he was known to be a little miserly, but he was an odd sort of a miser because he spent millions bolstering the United States government during the war of 1812 when it was on the verge of bankruptcy.

Girard's life is probably depicted best in the four mural paintings in the Director's Room of Founder's Hall building, representing the four great interests or activities in his life which brought him fame and fortune.

1. Mariner and Merchant — West Wall

On the west wall Stephen Girard is pictured as a mariner and merchant. He was a short squat, swarthy sea captain with one blind eye, believed to be since birth. This mural portrays Girard on the wharf among his workmen, and surrounded by piles of boxes, bales, ships at anchor, and a spacious warehouse as he carries on his important business. Workmen are unloading his favorite ship, *The Good Friends*. He probably loved these occupations most as he knew by experience the life of the sailor and all the vicissitudes of navigation. He was familiar with scores of ports, and his genius for trade and commerce had no limit. No other buyer knew better the products of countries and the whims of markets and climates. Here is truly a realistic portrayal of the talented, shrewd, intelligent, and liberal trader. He was the son of a seafaring and merchant family. On his first trip to sea as a lad he had a $300 share in the cargo, and as an apprentice was trained to be a ship's officer and a trader. As a young boy he voyaged to and traded in far-off places such as Haiti, Martinique, Santo Domingo, New York, and New Orleans. He managed somehow to get by storms and the sly tricks of traders. At the age of 26 he was master and part owner of the Jeune Bebe. He was headed for New York, but a very strong storm and the British blockade against the rebellious colonists forced him to the port of Philadelphia on June 6, 1776, where he remained to gain his fortune. He did not dare to return to France because there were two judgments against him for debts, which he refused to pay. Another reason for not returning to his native country, was that the Jeune Bebe was confiscated by the Americans and paid him in continental paper dollars which were worthless anywhere else. He feared that the war and the accompanying inflation would lessen the local value of the dollar, so Girard invested the money in goods and opened a small store. The store was stocked with tobacco, cider, sugar, salt, flour, butter, wheat, beef, rum, whisky, and turpentine in small quantities. This meager stock materialized into a large trading business, a world-wide fleet of merchant ships, and a large bank which brought him fame and made him the multimillionaire of the United States. Although this may seem absurd or contradictory, it has been said that Girard's early business methods were at times unethical; but in his later life there was a complete change in his business tactics, his word was as good as his bond, and in his will he ordered the teachers to "take pains to instill into the minds of the scholars the purest principles of morality — and a love of truth."

Stephen Girard, the founder of Girard College



Entrance to the Girard College ground

2. Banker and Patriot — South Wall

On the south wall Mr. Girard is portrayed as a banker and patriot. For many years he was interested in the first United States Bank which was modeled after the Bank of England. When the United States Bank ceased to exist in 1811, Girard bought the property and established a private enterprise called the Bank of Stephen Girard. His skill and courage made this one of the greatest financial institutions in the United States of America. When the people subscribed less than half an authorized loan of $16,000,000 during the war of 1812 and the United States Government verged on bankruptcy, Girard arranged for the purchase of $8,000,000 of its bonds over and above his already substantial subscription and saved the nation in its war crisis.

Foundry work at Girard College

3. Citizen and Humanitarian — East Wall

On the East wall we see Stephen Girard as a humanitarian. In 1793 Philadelphia was almost deserted during the yellow fever epidemic. Over 4000 died of this terrifying disease. Hundreds of citizens fled in terror while Girard remained in the city, giving his fullest devotion to the stricken and dying, and risked his own life by taking personal charge of the sick in a temporary hospital. The city library, coffee houses, and most of the churches were closed. This mural depicts Girard as a humanitarian at Bush Hospital, with his associates Peter Helm and the San Dominican physician, Jean Deveze, receiving a stricken yellow-fever victim.

4. Altruist and Benefactor — North Wall

The most interesting scene to Girard's friends, students, and alumni of today, appears in the north mural. Here Mr. Girard stands before Founder's Hall as an altruist and benefactor, the background of which is his distinguished monument, shown here at the age of 81. It depicts how happy the mothers seem of placing their sons in the care of the richest and certainly one of the wisest men of his generation. The mothers and boys are symbolical of the thousands who have been aided by the College. More than 15,000 of these boys have already been graduated from the college to serve with lives endowed richly by Girard, and many of them occupy positions of leadership and influence along many walks of life. No graduating class ever leaves the College without writing voluntarily an enthusiastic and glowing tribute to the Founder.

Girard College is probably the most unusual outstanding educational institution in the world for fatherless needy boys between the ages of 6 to 18 years. The age limit for admission to the school is 6 to 10 years. It is America's most richly endowed and largest boarding school, with a current enrollment of 1300, against an enrollment of 100 on its opening day on January 1, 1848. The boys are happy and very much at home in their "Hum" (a colloquial expression for Girard College brought down by tradition) because it has no atmosphere of an orphanage. They do not wear uniforms nor are they under any strict regimentation. The boys' suits are tailor fitted, and each boy makes his own selection from bolts of cloth which the school buys. Each boy receives a minimum of two suits a year, with two pair of trousers, and at least two pair of work and play pants. Each boy has his individual washstand and mirror, and special place set aside for his personal belongings, representing a privacy of personal possession, which is rare even in families of wealth. The care and attention a Girardian gets is equivalent or even better than that offered at a private boarding school. Yet he gets all of it free at an expense to the college of about $15,000 for his stay covering approximately 10 years. The boys live a natural and relaxed life at Girard, which is carefully fostered and checked by a special department of a psychiatrist and two psychologists. Girard College chooses good teachers and pays them good salaries.

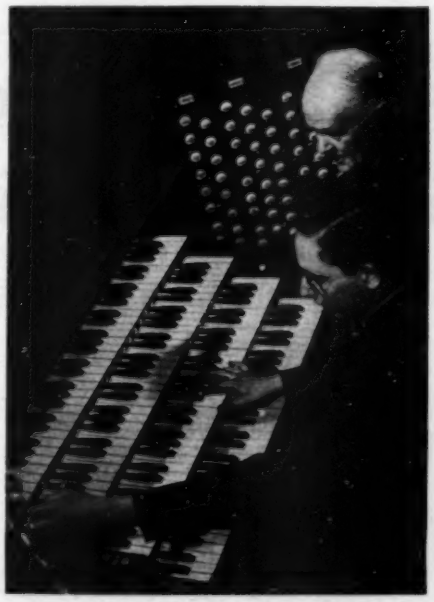
The boys have every type of recreational, athletic, musical, art, and trade training opportunities at Girard in the

Girard news goes to press

most modern up-to-date methods. All the boys join in the athletics in a very elaborately equipped gymnasium, and they get expert swimming lessons in their two swimming pools. Each boy gets a musical education and by the time he reaches his fifth grade he can read music. If he shows talent he is taught to play on a musical instrument through the means of private lessons. They have a choir, a glee club, an orchestra, and a band. They have clubs to build model airplanes, take photographs, and engage in various other hobbies. There are special classes in art.

Girard boys stand out wherever they go for their excellent training and behavior. As part of the regular curriculum, in addition to complete grounding in academic subjects, they are taught etiquette, dancing, how to behave in the company of a girl, and even how to make conversation with her family while waiting for her. This is all done so that they will be well equipped to face life with decorum and be uninhibited in social activities.

Practical training to prepare young men to become immediately self-sustaining has been the school's first consideration. The boys are required to try out ten different trades — sheet-metal worker, foundryman, machinist, electrician, patternmaker, auto mechanic, office worker, carpenter, draftsman, and printer. After his tryout he has his choice and informs the staff psychologist which of those he liked best. The psychologist gives him an aptitude test,



Talented boys receive special instruction in music

and after checking the instructor's reports, advises him which trade is best suited to his ability. This gives them something to fall back on when they leave the college, although many of them go on to higher education and become professional or businessmen.

The office of student relations and vocational guidance at Girard acts as a job placement service and as an educational guidance for higher education to all colleges. No other educational institution offers so complete an alumni service as Girard does through their efficient follow-up system.

Stephen Girard was a stickler for hard work, and he loved to see the boys trained well. He realized, more than a century ago, that youth is a nation's greatest resource and that only by education can the wealth in it be extracted. So Girard selected the neediest, those most likely to be neglected. His free college for fatherless youth was an object lesson to his countrymen. The foundation grew to upward of $90,000,000 and the college became the largest of its kind on earth. Its alumni, since the opening in 1848, number 15,000. They have moved into all walks of life, to do signal service in business, the professions, research and scholarship, artistic fields, and public office.

The most controversial phase of Stephen Girard's will was the religious aspect because under the terms of the will, no clergyman of any sect is allowed to enter the institution. One very admirable distinction of Girard College is that the bible is read every morning, chapel services are held regularly, and grace is said before each meal, and prayers are said before retiring for the night. However, boys are now encouraged to follow the religion of their parents, and to attend their church off the campus grounds. Mr. Girard stated in his will that since there is such a multitude of sects, and such a diversity of opinion amongst them, that he desired to

The chemistry laboratory

keep the tender minds of the orphans free from the excitement which clashing doctrines and sectarian controversy are likely to produce, and expressed the wish that the boys choose their own faith at a mature age. Because of the restrictions placed in the will, the surrounding stone wall, 10 ft. high and about 1¼ miles long around the 42 acres, gives the place an air of mystery from the outside. But when one enters inside the gate, which is neither patrolled nor guarded, one is amazed with the luxurious outlay of 29 buildings of Greek and modern architecture, with well-kept spacious grounds of trees and shrubbery resembling the campus of a first rate private university. Founder's Hall is a building full of ingenuity and invention — a beauty which neither words nor pictures can express.

The boys, for a moment, are strangers when they first enter the gates of the largest boarding school of its kind on earth. But only for a short time are they ill at ease, because the wise and experienced governesses and teachers, many of whom have served the college more than a quarter of a century, have the human touch and the understanding of child psychology needed to adjust new boys to their changed environment, and after a short period of time the newcomers love it there.

Since there are still a great number of people throughout the United States who haven't heard of Girard College, I am sure many widowed mothers would be grateful for this informative article, especially since Girard College is now admitting students born anywhere in the entire United States, whereas, up until recent years, they admitted boys born only in Pennsylvania. It is America's most richly endowed and largest boarding school with a current enrollment of 1300 between the ages of 6 to 18 years. Not only boys of very poor families are admitted to the college, but a family of moderate circumstances can also make application. The board would decide upon the applicant after making a thorough review of the case.

Girard's benefaction to education was the capstone of a life of service to his adopted country. Little did he know, when he founded Girard College, of the immeasurable honor and service he was to confer upon Philadelphia and the nation during his lifetime, and the roles he was to play as her leading benefactor after his death.

What Teachers Should Do About Contemporary Design

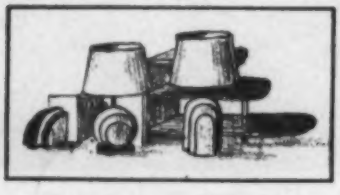
A. F. BICK
Milwaukee, Wis.

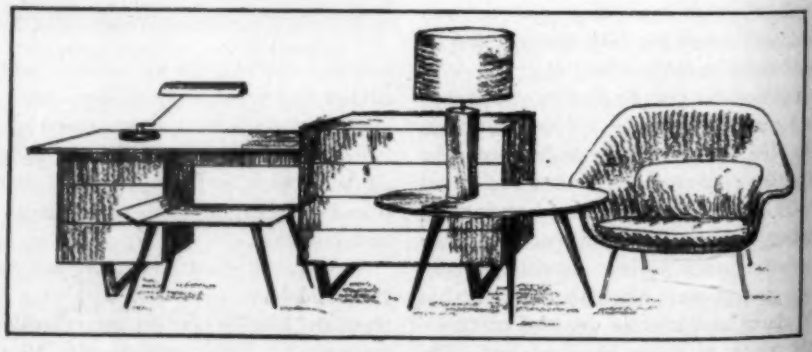
Contemporary is the design of *tomorrow*. It is a word that freely sums up our hopes and ideals environmentally.

Contemporary is not to be taken as *modern* nor *modernistic*, if by these terms we mean the various levels of unfortunate copying and recopying of straight-line and *juke box* form.

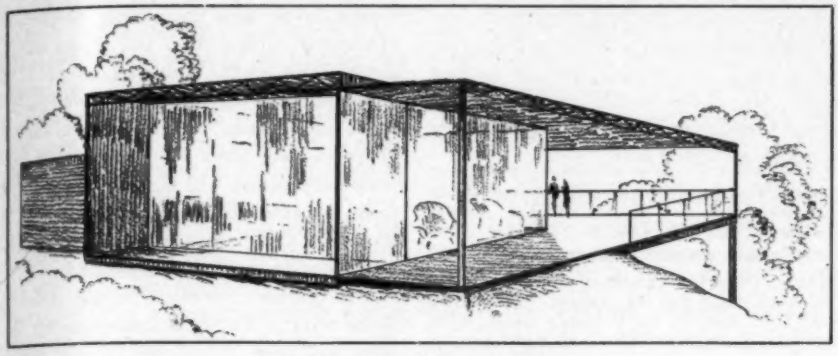
Contemporary design is creative from the start. It is an ever evolving symbol of newness. It is in itself a philosophy of freedom, spontaneity, and serenity.

Unhappily, there are people willing to take conditions as they are, thus becoming involved in the things of the past, believing in its apparent immovability. These persons by the thousands are to be credited with environmental stagnation and the masquerade of *period* design. Fortunately, however, there are always a minority of experimenters who base their premises upon the work of fellow searchers in engineering laboratories and architects' offices who translate products and methods into new pictures and trends, continually injecting into the static present propositions of re-





Contemporary design



Contemporary home design

habilitation, challenging fixed views and imposing on them new concepts of freedom. These continue to build new mental pictures that today are the trend for the coming age.

Out of this process has slowly emerged a set of symbols descriptive of the character of this swiftly evolving *tomorrow:* freedom, light, cleanness, and newness; strength and simplicity; dignity, serenity, and quiet; honesty; and continuous movement.

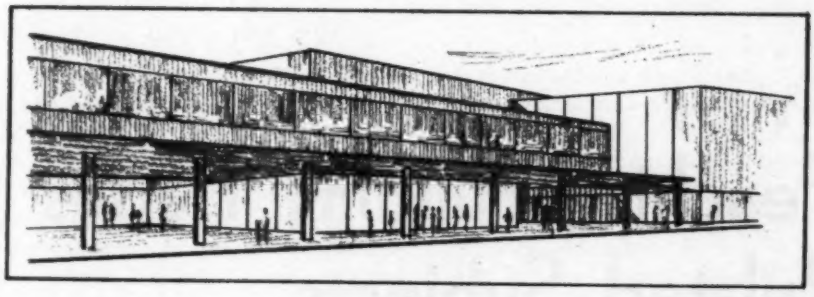
Very good, but in what respect are they the keynote of the contemporary trend?

1. In home design, we experience more and more the thrill of glass walls, space, and light.
2. On our business streets we find increasing examples of glass-curtain structure and glass-front openness, each new creation expressing these qualities in some degree.
3. New shopping area projects in many cities are strong in the characteristic unity of idea.
4. In contemporary furniture, we find the following agreement with the stated principle:

It is strong by force of its oneness and simplicity; it has dignity and serenity by the same token; it is clean, open, light in weight and color as a symbol of an air age might be expected to be. Some examples even seem poised in air as when they stand on light metal legs. The contemporary is free of bombast and clutter; it effects a minimum of wood grain and of apparent structure, and newness is expressed through fresh uses of form. By these means, every obstruction is removed from the way of the observer until he may see beyond the piece into its use. If he is in a mood, he may feel a kindred endlessness through the open foil and transparency of its clean areas, seeing through it into space and time, degrees of refinement, magnificence or greatness he may feel at the moment.

In addressing this to teachers, let it be said that it is not a matter of liking or disliking *contemporary,* and it is not a choosing between this period and that.

A teacher is traditionally an authority in matters of knowledge. Contemporary design is a fact in contemporary life, an area of thought which he must be ready and fit to evaluate in relation to other values of the time.



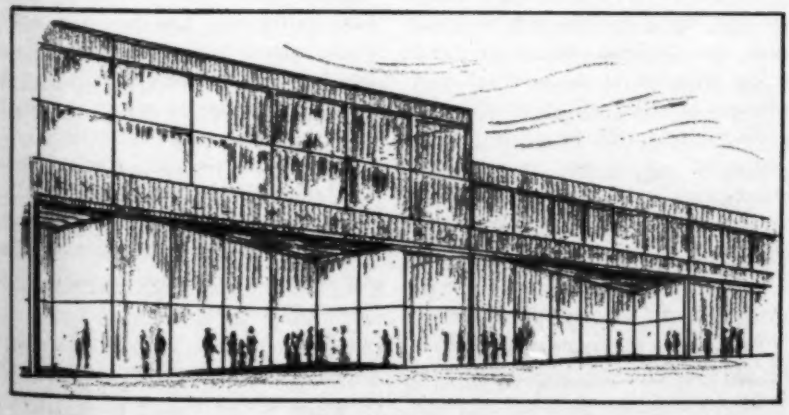
Contemporary business streets

A teacher owes a trust to the time in which he pursues his profession. He is conspicuous in his place. He is watched by those jealous of their youth, and by those jealous of the arts and ideals of the time. Both expect that, being a teacher, he should know better what his critics and his well-read compatriots know.

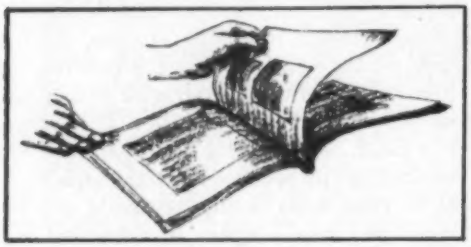
This is what they know:

They observe and they read of the work and the reasoning of the top professional furniture and building design researchers and analysts as reported in professional organs, or more likely, as reviewed by critics in top home magazines. Through these offerings, they observe a consistent build-up of underlying principles and standards, from which they gather the fact that

> *contemporary design* in the nation is the creation of and is maintained by a relatively small group of top professional designers and achitects plus their



Shopping areas



reporters and writers. These together constitute the high authority in present accepted *American contemporary design.*

It is, therefore, reasonable that every industrial-arts teacher in the nation will profit immeasurably by striking up an acquaintance with authentic top reporting of this work, and names such as Frank Lloyd Wright, Bruce Goff, Charles Eames, Eliel and Aero Saarinen, Robesjohn Gibbings, Isamu Naguchi, Walter Dorwin Teague, and a group of others of equal importance should be more than names to them.

Industrial-arts teachers may reach out into this contemporary world and learn as easily as if by paging through picture books, the books in this case being the nation's authoritative design sources, a few of which are listed here:

1. *Architectural Forum,* the Magazine of Building, Time, Inc., 540 North Michigan Avenue, Chicago 11, Ill. $5.50 annually (schools)
2. *Interiors,* Whitney Publications, Inc., 11 E. 44th St., New York 17, N. Y. $5.
3. Knoll Associates, Inc., catalog, 575 Madison Ave., New York 22, N. Y. Single copies, $3.50.
4. Herman Miller, Inc., catalog, Zeeland, Mich. $3.
5. *Every Day Art Quarterly,* Walker Art Center, Minneapolis 5, Minn., $1 annually, and others.

If these sources are not available through the teachers' personal budget, surely their departments would benefit, even if but a few magazine copies were distributed to each teacher annually.

Today, design is inseparable from the industrial product, and it is as inseparable from the product of industrial arts; machine shop, welding shop, and woodshop. Design is perhaps the greater proportion of commodity salability. The Diesel trains, automobiles, pens, and washers of 1935 might fail on a 1950 market. "1940 building is out of date."* Industrial arts cannot afford to trail. More attention to true contemporary design will save the department from possible disparagement when, as it appears today, human values and the technical become too widely separated.

The teacher, therefore, should come to terms with professional contemporary design, and raise himself out of any degree of mental maze by simply introducing himself through convenient, but faithful paging through and absorbing what authentic professional journals of design offer him. With consistent monthly repetition, industrial arts will make strides toward its yet barely touched potential, freed from the yoke of questionable design policy and ready to give spiritual uplift to millions who hunger for the finer qualities of life.

*Quoted from a top building journal.

Teaching Building Trades Related Subjects

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It has long been recognized that an expert craftsman is entitled to be called an expert only when he has, in addition to his manipulative skills, full knowledge of the technical problems of his trade.

Importance of Technical Knowledge to the Building Trades Craftsmen

In manufacturing industries the *work is taken to the worker;* hence the training required pertains only to the type of work being done. In the construction industry *the worker is taken to the work;* this requires the worker to be prepared for almost any job experience within the limits of his craft. During a day's work the tool or manipulative work done may require the highest type of craftsmanship; again it may be repetitive work requiring but little actual skill. Because of the wide variations possible the building trades craftsman must be prepared to do work of varying degrees of skills and technical knowledge. In fact this work variation is one of the strongest reasons why apprenticeship is so necessary and important to the construction industry. A building craftsman must possess a broad understanding of his trade.

What Are Related Subjects?

Technical Work: Probably no better or more understandable definition has been given to describe the term "related subjects or technical knowledge" than the one given by the late Charles (Skipper) R. Allen. "In manipulative work the stock actually changes shape; in technical work the stock to be worked on still retains its original shape after a technical job has been performed." On this basis, building trades related subjects can be fairly easily listed as shop sketching and drawing, blueprint reading, layout work, and quantity survey (usually called estimating).

Industrial Relations: Human relations that affect the *worker* include labor laws, employer-employee relationships, personality factors, and other similar topics. These are sometimes classified as industrial and human relations.

Student Classification

When preparing teaching material for a trade there are two types of students to

be considered, namely: (1) the vocational student who is receiving training in a vocational class preparatory to entering industry (often called a preapprentice) and (2) the worker who is already employed and even though he may not be working under an ideal plan of apprenticeship is called an apprentice.

The basic principles underlying the *teaching* of related work are the same irrespective of the student's classification. The *content* of a related subjects course will, however, vary greatly as between preapprentices and apprentices. Preapprentices must receive broad fundamental training on which specific skills can be built. Apprentices should only be given training which will actually supplement their daily work experience.

The Basic Technical Content Required for a Building Trades Program

For any trade, the technical content can be arranged under the following topics:

Trade terminology covering commonly used terms and expressions needed for the specific trade involved.

Blueprint reading covering specific information as applied to the trade being taught.

Drawing and shop sketching covering construction methods, layout methods, and geometrical construction as needed for the trade being taught.

Layout problems as applied to buildings, openings, arches, various geometrical figures, rafter cutting, and stair building with emphasis given to the needs of the trade being taught.

Trade mathematics covering quantities of materials, and layout procedures; figuring costs of materials.

Care of tools, equipment, and material to emphasize need for conservation of materials and tools.

Knowledge of materials including such items as kinds, grades, sizes, uses, purchasing units.

Safety practices which should be followed to eliminate scaffold hazards; care in handling and placing tools, proper craft clothing.

Layout Work: The content of a unit of layout work is based on the trade under consideration. Layout work for a bricklayer refers to the layout problems for various brick bonds. The term also applies to the location of different parts of a building, such as arches, columns, etc., often done through laying out a story pole. Layout work for the plumber refers to the isometric pipe layout sketch required for a plumbing installation involving angle measurements. The carpenter's layout problems pertain to locating a building on a lot; laying out door and window openings; layout out rafters and stair stringers. The sheet-metal worker requires a good background of geometry in order to do his layout jobs. The plain plasterer has a little layout work to do in imitation stonework; the ornamental plasterer and the skilled metal lather both have a common problem in geometrical layout work that calls for a high degree of technical knowledge. The exterior house painter has no layout problems at all; the interior decorator has problems, particularly when paneling, stencil or decorative work are required. The paper hanger has many layout problems in handling figured and patterned wallpaper and in layout work connected with fitting paper in odd shaped areas. The tile layer has a progressive series of layout problems as he plans his work so that tiles match properly and odd cuts and uneven lengths of tile are eliminated. This involves a knowledge of practical layout procedures based on geometrical principles.

Interpretation of Blueprints: Most of the various building trades craftsmen should understand the organization of a blueprint and understand the symbols and plan indications. The emphasis in teaching is, of course, placed on the blueprint items which pertain to the trade involved.

Trade Drawing: If an architect has made a full and complete set of plans there should be little need for any drawing work to be done "on the job." And yet, how often has the foreman taken the plans home at night and brought back a working sketch or drawing which makes it possible for the workmen to carry out their work correctly and more efficiently?

Training programs for carpentry, cabinetmaking, sheet metal, and bricklaying should include construction drawing work. Each student should be taught to draw those parts of a building which will help him determine the proper relationship of each to the other. Drawing for other building crafts is probably not so pertinent.

Quantity Survey or Estimating: The term estimating, as used in this article, refers to materials only. Contracting employers are concerned when they find new workers being taught labor estimating as they know that only through long years of trade experience can one become an expert labor estimator. They believe it is a valuable attainment if a worker can estimate through careful calculating quantities of materials and do this "on the job" to keep it progressing. Primarily, material estimates are made by the foreman; yet in construction work one never knows when a journeyman will be sent to a small job with instructions to "order the materials; start and complete the job."

How to Determine Teaching Content for Apprentice Students

An apprentice self-evaluation blank has been successfully used to discover training needs for apprentices.

NOTE: The meaning of the evaluation terms used should be considered to be about as follows:

Excellent: Can do a first class job of craftsmanship in less than the average time and without supervision.

Good: Can do the job in a satisfactory manner but needs some supervision.

Average: Can do a passable job but needs constant supervision.

Little: Has had little experience doing the job being evaluated.

None: Has never done the job and is completely uninformed on how to do it.

An apprentice evaluation sheet can be developed as follows:

A. List all of the major jobs an apprentice must learn before he is qualified to be called a journeyman. (Trade advisory or apprenticeship committees are very helpful in making this list.) Make two lists — one for manipulative and the other for technical work.

B. Place the list in logical order and make five vertical columns. Head each column respectively: excellent, good, average, little, or none (giving definitions of these terms). See illustrations which follow, which present samples of several building trades checkup sheets.

C. Ask each apprentice to evaluate himself on his ability to do each job listed, placing a dot in the proper column to indicate the estimated evaluation.

D. Connect each dot and a profile will result. A study of this line indicates units in which the apprentice considers himself weak or as having no experience. The instructor should, if possible, provide instruc-

tion for these units. After a period of time, say six months, another evaluation can be made using the same sheet but a different colored pencil. A comparison with the previous profile will show the growth of an apprentice.

If the instructor doubts the apprentice evaluation he can give him an actual examination on the unit which is questioned and convince either himself or the apprentice, as to the accuracy of the original evaluation. The training program for this apprentice should then be adjusted accordingly.

Apprentice Checkup Sheets

The accompanying three tables represent a "sampling" of three apprentice checkup sheets. The units of work given for each trade are *not complete* but have been selected to show the method used to determine the ability of an apprentice and what training units he should be given.

Teaching Suggestions

The question to be considered is: "What is the best method for teaching blueprint reading or layout work or quantity estimating?" A few successful practices can be described.

The best time to learn a fact is when you need it. This statement has been an accepted vocational teaching principle for many years. If the teaching conditions permit this method of instruction the instructor is fortunate. However, teaching procedures must be practical and adjusted to teaching conditions.

Daily or intermittent training. Smith-Hughes vocational regulations require that a definite period of time must be spent teaching the technical content of the trade. In some trades an hour or an hour and a half daily is best; in other kinds of work it may be necessary to let the manipulative work progress for several days; then call the class together for a few days of continuous related study.

Related training under a "pseudo-training" setup. When a pseudo-training setup is used for trade training, related material can be taught *as the need arises.* Bricklaying, plastering, or tile setting are good examples. In these trades it is possible for the instructor to *create* the trade problems to be learned. It may be constructing a brick wall or an arch or a fireplace; if plastering, it may be plastering on a concrete wall, or on metal lath or doing a piece of ornamental plastering. The tile instructor may set up a wall surface to be tiled, or ask the student to tile a drainboard. As long as the instructor can control the manipulative job he can as easily

Carpentry Apprentice

Units	*Jobs*	*Evaluations of Your Ability and Knowledge to Perform These Jobs (See note below)* None	Little	Average	Good	Excellent
Concrete Work	Build straight concrete forms for columns and beams	....	....	....	....	....
	Line up and brace concrete walls and columns	....	....	....	....	....
	Build curved concrete forms	....	....	....	....	....
	Set girders	....	....	....	....	....
Framing	Set floor joists	....	....	....	....	....
	Erect walls and partitions	....	....	....	....	....
	Line up and brace framed walls and partitions	....	....	....	....	....
	Cut rafters	....	....	....	....	....
	Build staging	....	....	....	....	....
Exterior Finish	Lay wood shingles, and composition roofing	....	....	....	....	....
	Cut and fit siding	....	....	....	....	....
	Lay out window and floor frames	....	....	....	....	....
Interior Finish	Lay pine floors	....	....	....	....	....
	Cut and fit moldings	....	....	....	....	....
	Set door jambs	....	....	....	....	....
	Case openings	....	....	....	....	....
	Fit and hang double hung windows	....	....	....	....	....
	Fit hardware and fastenings	....	....	....	....	....
	Fit and hang doors and casement windows	....	....	....	....	....
Reading Blueprints	Recognizing plan symbols	....	....	....	....	....
	Reading	....	....	....	....	....
	Plan views	....	....	....	....	....
	Elevations	....	....	....	....	....
	Sections	....	....	....	....	....
	Details	....	....	....	....	....

Directions: Estimate your own ability and knowledge of each item by placing a small x in the proper column. Then connect each x with a line.

Plumbing Apprentice

Units	*Jobs*	*Evaluations of Your Ability and Knowledge to Perform These Jobs* None	Little	Average	Good	Excellent
Roughing In	Cutting and reaming pipe	....	....	....	....	....
	Threading pipe	....	....	....	....	....
	Using plumber's furnaces	....	....	....	....	....
	Cutting holes in building for pipes	....	....	....	....	....
	Drilling and tapping metal	....	....	....	....	....
	Pipe fitting assembly	....	....	....	....	....
	Calking joints	....	....	....	....	....
	Sweating joints	....	....	....	....	....
Knowledge of Tools and Materials	Pipe	....	....	....	....	....
	Fittings	....	....	....	....	....
	Fixtures	....	....	....	....	....
	Hand tools	....	....	....	....	....
	Power tools	....	....	....	....	....
Order Writing and Checking Material	Getting out materials from written orders	....	....	....	....	....
	Checking in materials from jobs	....	....	....	....	....
Angle Measurements	45-deg. angle	....	....	....	....	....
	60-deg. angle	....	....	....	....	....
	Combination angles	....	....	....	....	....

control the time, place, and content of the technical problems involved.

If the building is under construction, the carpentry instructor must, of necessity, postpone the teaching of some pertinent technical problems until some more advantageous time and place. In this case the teacher should outline, in advance, the entire content of the related work to be learned and then see that this work is adequately covered during the school year.

Combination subjects. Drawing and blueprint reading or estimating and blueprint reading make good combination subjects for carpentry and bricklaying students as these workers do actual construction and need to know how the different parts of a building are assembled. To a lesser degree the sheet-metal worker can likewise profit by a combination of these subjects.

Building trades which are decorative in character, such as plastering, tile setting or painting and decorating, require principally that the students should be taught how to *interpret* the drawings.

Electrical and plumbing trades need to have a blueprint reading course covering the special drawings which are made for these two trades, particularly office or industrial building drawings.

Material estimating: When teaching material estimating use full size drawings. This will enable the students to learn to estimate and read blueprints at the same time. A satisfactory method is to precede the blueprint-estimating combination with a series of written estimating problems. These problems should give complete job information and a statement of the estimating rule to use. Sometimes these problems can, to advantage, be preceded by a little fundamental drilling on some basic arithmetical principles. The drilling process should be used when a student has discovered his need through inability to solve the problems.

Summarizing the estimating suggestions:

1. Supply each student with a set of practical estimating problems which give complete trade information and the estimating rules to be followed.

2. If a student has difficulty in solving these problems, due to lack of handling figures, provide him with abstract problems which emphasize the arithmetical principle involved.

3. After the textbook problems have been completed, assign each student a book of estimating rules[1] and a blueprint from which a list of materials must be "taken off." This is effective for evening school students. The material is usually taken off in the construction order. The student profits as he "thinks through" the blueprint and sees the relationship of estimating to an actual job.

Electrical Apprentice

Units	*Jobs*	*Evaluations of Your Ability and Knowledge to Perform These Jobs* None	Little	Average	Good	Excellent
Knowledge of Work	National	....	....	....	....	....
	State	....	....	....	....	....
	County	....	....	....	....	....
	City	....	....	....	....	....
Tools and Materials	Hand tools	....	....	....	....	....
	Power dies	....	....	....	....	....
	Hydraulic benders	....	....	....	....	....
	Carrying capacity wires	....	....	....	....	....
	Types, wires, and cables	....	....	....	....	....
	Conduit, size required	....	....	....	....	....
Reading Electrical Blueprints	Recognizing plan symbols	....	....	....	....	....
	Reading	....	....	....	....	....
	Plan views	....	....	....	....	....
	Elevations	....	....	....	....	....
	Details	....	....	....	....	....

Models and teaching devices: For all technical-subject-teaching the use of models is invaluable. They should be small enough so that the students can at a glance see the relationship of all of the parts in the model. These models should conform exactly to actual trade practices and methods.

Pictures, material charts, samples of materials and catalogs are splendid teaching aids. The old Chinese proverb "a good picture is worth ten thousand words" is still true. These teaching aids enable the instructor to assist students who fail to get the information the first time. They also simplify the instructor's work.

Large drawings on sign painters cloth are worth while and useful. Use an ordinary blue pencil, make the lines very heavy so they may be easily seen from the rear of any ordinary classroom. Each student should be provided with a set of blueprints from which the large drawing was made. The instructor hangs the large drawing in front of the class and teaches directly from it, using a pointer to indicate the different parts of the building.

To teach roof framing to carpentry students, use three ply paneling, about 5 by 10 ft., and construct a flat tablelike surface, which has been shaped to conform to a building layout. Fasten on a set of legs to make it table height. Around the rim of the panel board nail a 1 by 2 to represent the top plate of a building wall. Then paint the surface with blackboard paint. The model is now, in reality, a flat blackboard on which an actual roof may be constructed, using 2 by 3-in. or 2 by 4-in. rafters. The plan layout of the roof is made directly on the blackboard. See Figure 1.

The instructor can then demonstrate various rafter shapes and cuts; have all students lay out various rafters and have a few cut their rafter patterns. In a few weeks' time the class will have actually constructed a model roof. This roof is large enough for each student to see the relationship between all of the rafters and also gives each one actual layout experience. Colored chalk can be used on the blackboard surface to demonstrate the various intersecting rafter cuts.[2]

Industrial relations problems. Industrial relations and human problems need more emphasis for the preapprentice type of class than the apprentice class as these students have not had actual trade experience and need to be prepared to cope with problems pertaining to employment. The need for this kind of training is readily

[1] See Wilson & Rogers *"Simplified Carpentry Estimating"* (New York: Simmons-Boardman Publishing Corp.), also Painting and Decoration Contractors of America *"Price Guide."*

[2] See Wilson & Werner *'Simplified Roof Framing"* (New York: McGraw-Hill Book Co.), also Audel's *"Carpenters' and Builders' Guide,"* Theodore Audel, 49 W. 23rd St., New York.

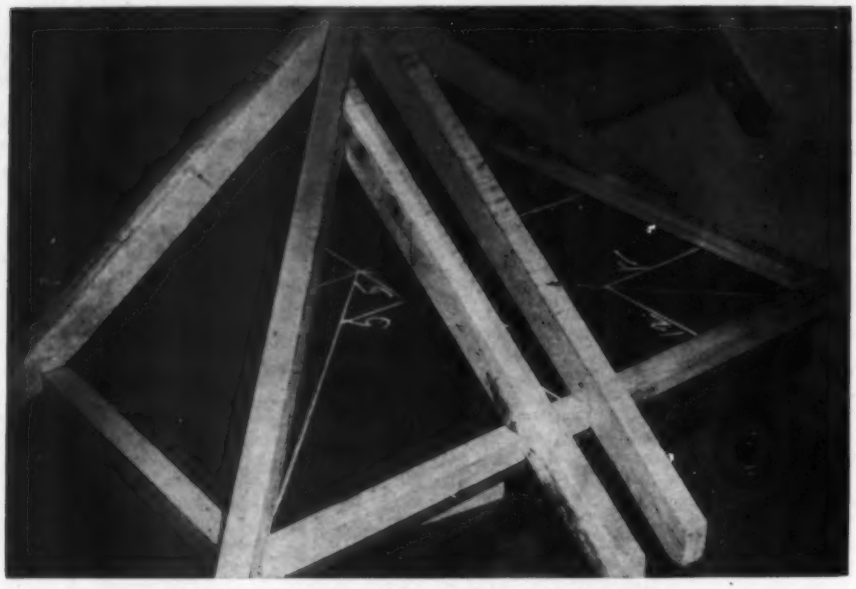

Fig. 1. Teaching aid for roof framing instruction
— Photograph, courtesy of Junior College, Compton, Calif.

apparent when one studies the causes of why people lose their jobs. One such study has resulted in the statement: *"Eighty-five per cent of the reasons why people lose their jobs has nothing to do with their trade ability or skill, but is definitely due to a lack of understanding of how to work with other people."*

Some satisfactory topics which can be taught under the heading of industrial relations are:

Working Conditions: Hours, wages, employment possibilities, seasonal employment, health and safety.

Industrial Development: The growth, size, importance, scope and trends of this industry; other industries that support it, and its relation to other industries; the extent to which this trade opens employment opportunities in related occupations, such as, inspectors for various phases of building construction. Also many successful contractors have come up through the ranks as apprentice, journeyman, foreman, superintendent, and then have started their own business.

Industrial Organization: How the trade is organized, employer and employee associations, and what their functions are and their relation to each other.

Shop Relationship: The relationship between fellow workers, the foreman, shop steward, and employer; how these affect efficiency and happiness of worker. A happy or satisfied worker is always a good producer of work (assuming trade skill and knowledge). This condition of the mind can be partially produced by training.

Public Relations: Embrace those factors which have to do with consumer interest, confidence, honest work, fairness in dealings, loyalty to employer, responsibility as a craftsman and citizen to join with others in promoting better working conditions for all, and civic and social welfare for the community. An employee's attitude toward and comments about his employer or his fellow workmen have much to do in creating a favorable attitude on the part of the public who require the employer's services or product. This topic needs the constant attention of the instructor to get this information across.

Laws and Ordinances: City, county, or state or federal, that affect the worker, his job, trade, and industry.

Personality Characteristics: Individual attitudes and habits of work that should be developed to make a successful craftsman.

The conference method of teaching is effective when putting over an industrial relations problem. If a group of students is led by the instructor to agree as to desirable habits of work or if they learned to have an intelligent understanding of social problems and legislation that affects their work, a good teaching job has been done.[3]

[3]See Cushman's *"Foremanship and Supervision"* (New York: Wiley & Sons), for a clear explanation of the conference method of teaching.

Checkup Examinations

A checkup procedure is always needed to determine a student's progress. This may be a chart listing numerous technical jobs performed; sometimes a textbook will serve as a guide.

Technical examinations lend themselves to the use of the selective answer, the true and false completion or other type of objective questions. Identification tests are worth while and not difficult to prepare as certain kinds of materials, such as samples of lumber, plastic materials, pictures, drawings, and other similar items can be selected for identification. Apprentices can be given actual layout jobs to do, or they may be furnished with blueprints from which definite information can be requested.

Summary

1. Technical units of work should definitely be a part of any well-organized trades training program, whether for pre-apprentices or apprentices.

2. The effectiveness of the teaching content will be in proportion to the extent to which it meets the following:

   A. The teaching content is practical and has been approved by a trade advisory committee.

   B. The teaching material has been organized on the instructional basis of learning, from easy to hard.[4]

   C. The teaching content is definitely geared to the individual student's need and ability.

3. The effectiveness of the teaching will be in proportion to its meeting the following requirements:

   A. The instructor plans his clock program so that technical work will be balanced with the manipulative skills to be mastered.

   B. Technical material is available for all students at the time they need it.

   C. The students see the relationship of the technical material to the manipulative work of their trade.

   D. Apprentices have been *sold* on their need for technical training through some evaluation process which has indicated to them their need of technical knowledge.

[4]See Haynes, *"Teaching Shop Work"* (Boston, Mass.: Ginn & Co.); Jackey & Barlows, *"The Craftsman Begins to Teach"* (New York: The Macmillan Co.); Struck, *"Creative Teaching for Industrial Arts & Vocational Education"* (New York: John Wiley & Sons, Inc.).

(Continued on page 257)

PROBLEMS AND PROJECTS

SOUTH FLORIDA MODERN COFFEE TABLE

ARTHUR G. DECKER
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High School
Fort Lauderdale, Fla.

Square up plywood for top to required dimensions. Apply 1 by 5-in. oak braces to underside of top flush to the edges with glue and clamps. Protect the good surface from the pressure of clamps by the use of softwood blocks. After the glue has set, joint the edges of the top, straight and square. Apply banding to edges with glue and clamps and carefully protect surface of banding from clamps by use of full length glue blocks wrapped in paper. The paper is to prevent the glue block from sticking to the banding.

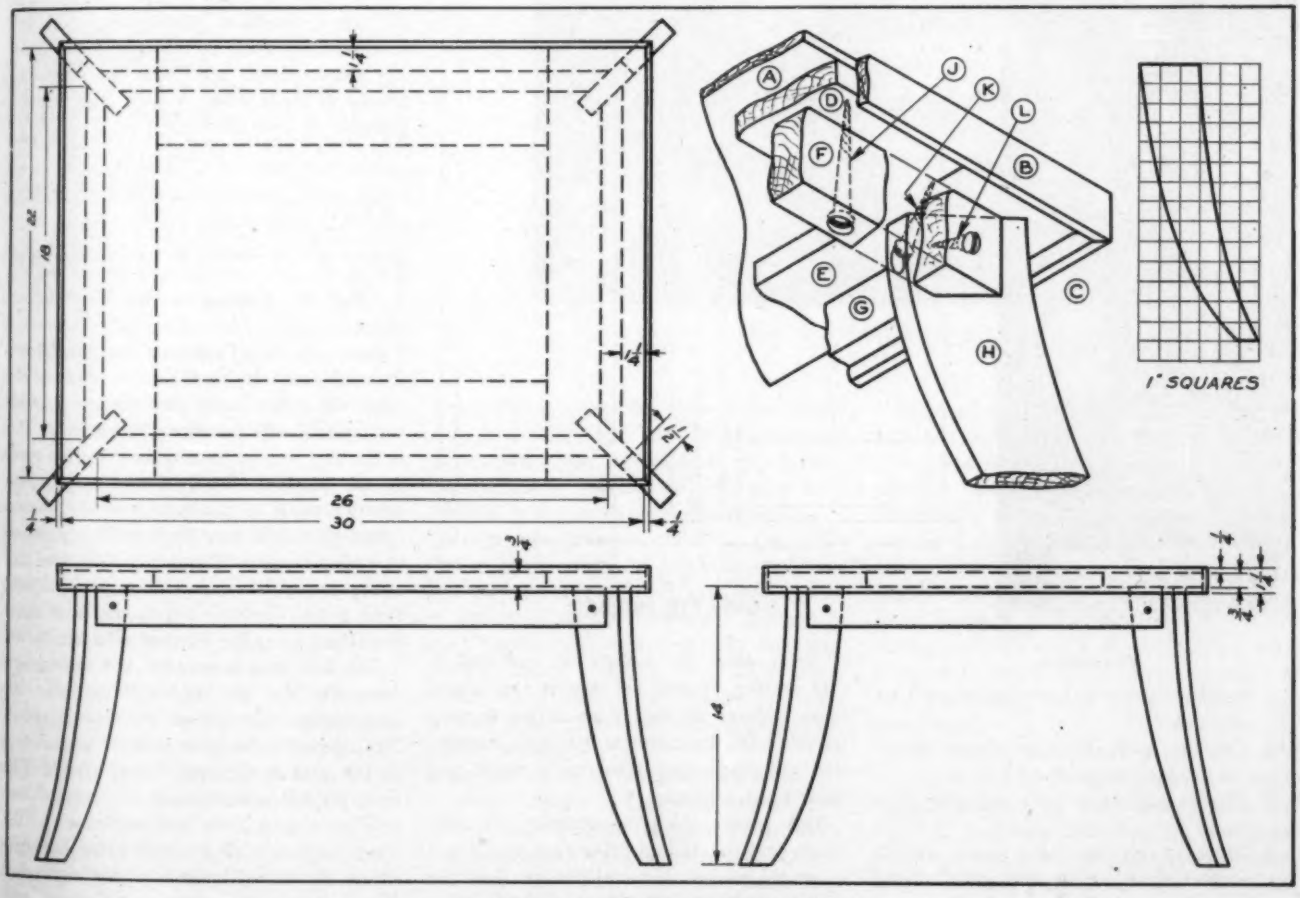
Make accurate cardboard pattern of leg and trace four legs on 1 by 6-in. stock. Cut out and sand very carefully. Scribe a line on underside of top from corner inward at a 45-deg. angle. Fasten a leg to each corner with a 2-in. No. 12 wood screw, and center the leg over the guide line previously drawn. See illustration.

Miter apron strips to length so that they extend from the leg to leg and fit firmly and flat against the side of each leg. Glue and screw apron to underside of top and to each leg. Be sure to stagger screws that fasten to leg so that they will not interfere with each other. *Caution:* In every case drill proper clearance holes for screws (7/32 in.), proper pilot hole (1/8 in.), and counterbore or countersink when necessary.

After glue has set for 24 hr., and table has been thoroughly sanded fill the grain with a mixture of wood filler and white paint or other suitable color. Green and red are very effective. This filler should be thinned to the consistency of cream, applied generously to all surfaces and rubbed off across the grain, after it has lost its gloss, with a piece of clean burlap. After 24 hr., give entire project a washcoat of shellac, cut with 1/3 volume of alcohol for quick drying and penetration. Follow this with several coats of dull varnish, rub down and wax.

BILL OF MATERIALS

Name	*No. of pcs.*	*Material*	*Size*
Top (A)	1	Oak plywood	1/4 x 2 x 30
Band (B)	2	Oak	1/4 x 1 1/4 x 31
(C)	2	Oak	1/4 x 1 1/4 x 23
Brace (D)	2	Fir plywood	3/4 x 5 x 20
(E)	2	Fir plywood	3/4 x 5 x 22
Apron (F)	2	Oak	1 x 2 x 26
(G)	2	Oak	1 x 2 x 18



South Florida modern coffee table

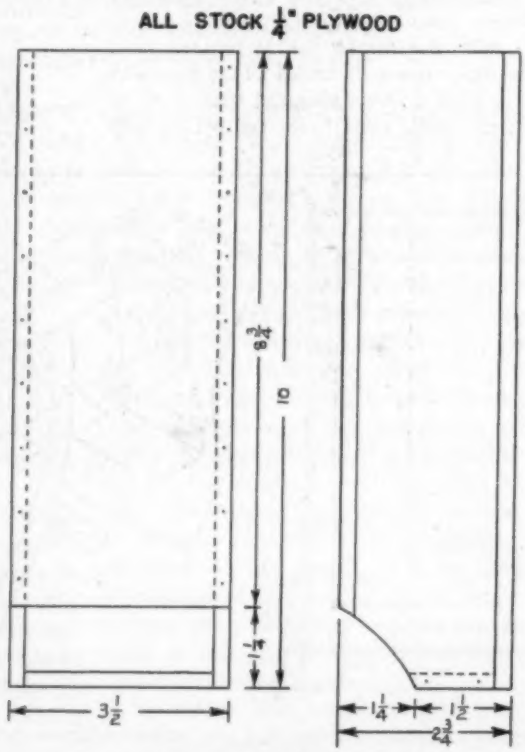
Name	No. of pcs.	Material	Size
Leg (H)	4	Oak	1 x 6 x 14½
Screws (J)	10	R.h.b. wood screws	No. 12 x 2½
(K)	4	R.h.b. wood screws	No. 12 x 2
(L)	8	R.h.b. wood screws	No. 8 x 1½

Glue, wood filler, white paint, shellac, dull varnish.
Approximate cost under $6.

CIGARETTE HOLDER

GEORGE W. SCHNEIDER
Industrial Arts Department
High School
El Monte, Calif.

This wood frame and copper tooled cigarette holder will hold a full carton (ten packages) of cigarettes.



CIGARETTE HOLDER

Procedure

1. Build wood frame according to working drawing.
2. Cut two pieces of 34-ga. copper 10 by 2¾ in., and one piece 4 by 10 in.
3. Planish side pieces with ball-peen hammer.
4. Trace design on front piece. Stipple around block letters with dulled center punch or tracing tool.
5. Oxidize copper, high-light, and lacquer.
6. Make ¼-in. 90-deg. bend on sides of front piece with bar folder and nail sides in place with ¾-in. copper escutcheon nails.
7. Paint exposed edges of wood on top and bottom of wood frame with copper paint.

CAREFREE CARVING

RICHARD C. REDMOND
Auburn, N. Y.

Working in wood is one of man's oldest mediums of expression. Down through the centuries skilled craftsmen utilized wood to express their hidden emotions, fears, and love of beauty.

Since woodcarving is a highly specialized skill and necessitates a background and knowledge of art, it is carried on by few amateurs. But there is one delightful method of working in wood which is open to all, and that is *chip carving*. It does not require the talents of an artist or the skill of an artisan to master this craft. Furthermore it is both inexpensive and fascinating. What more would you wish for in a pastime?

This craft which is spreading rapidly throughout the United States was introduced to us by way of Norway, Sweden, and the mid-European countries. At first glance a finished project looks complicated and a difficult thing to create, but appearances in this case are deceiving.

Actually chip carving consists of small triangular cuts — nothing more. It's the variations of these cuts arranged in different combinations which make the chip carved designs. Yes, and the variety of the designs are as numerous as the leaves on a tree. Being for the most part geometrical they can be constructed with the following tools: 2 knives (see Fig. 1), ruler, pencil — soft lead, and a compass.

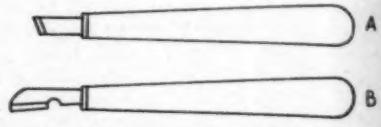


Fig. 1. Knives used by the chip carver

Other necessary items: basswood board ⅛ by 8 by 10 in., No. 3/0 sandpaper, oil stain, wax, and brushes.

The actual carving is done with the two knives that are shown in Figure 1. *A* in Figure 1 is the *sticking-out* knife, and *B* the *slicing knife*.

Care must be taken to keep the knives in the best of condition. Always keep them well sharpened by using an oilstone. Never under any circumstances use them for sharpening pencils or other work. A keen edge is indispensable in chip carving.

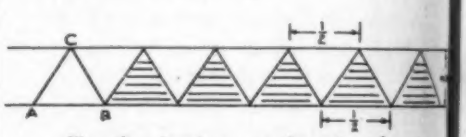


Fig. 2. Laying out the triangle

Once you have mastered the simple preliminary cuts, carving the more elaborate designs will come fairly easy. Let us examine the triangle *ABC* as shown in Figure 2. This is the first step in learning how to chip carve so the triangles should be laid out on your practice piece of seasoned basswood board. Other softwoods may be used but basswood answers very well. The two parallel lines and triangles are drawn according to the dimensions given. The shaded horizontal lines designate the area to be removed with the knives.

The first step is to stick out the triangle along the line *AC* and *CB* by using the sticking-out knife shown at *A* in Figure 1. The deepest penetration will be ⅛ in. deep at the apex or *C* point of the triangle. This same procedure is repeated all along the line.

When this is done you are ready to use the slicing knife, shown at *B*. Many beginners clutch the slicing knife in a death grip, but this isn't at all necessary. In fact, it only makes carving that much more difficult. The

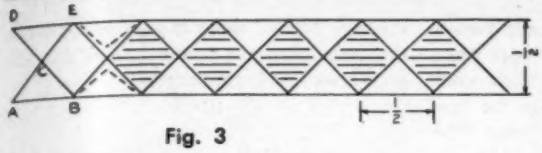


Fig. 3

correct method is to hold the knife firm, yet a trifle loosely, giving the user accuracy in making the cuts.

Since most of our work deals with angles, we must cut out the small chips with the board turned 90 deg. to the right. This is very important because in so doing, it will facilitate in making cuts.

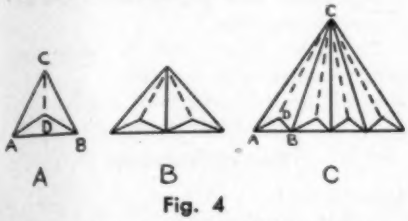


Fig. 4

Now we take the slicing knife and remove the triangle of wood *ABC* by slicing it out slantingly according to the way it was stuck out. Chip carving is as simple as that. In the diamond pattern shown in Figure 3 all triangles *ABC* and *CDE* are carved out exactly the same way. When this is completed a row of diamonds will remain.

In Figure 4 we have three variations of the triangle. In the design shown at *A* in Figure 4, lines *AD, CD, BD,* are all stuck out with the deep point at *D*. Now only two of the resulting triangles are sliced away being *ADC,* and *BCD*. The little triangle *ADB* is left as it is.

When several of these triangles are drawn together with a center apex, as in Figure 4 at *B* and *C,* they are carved in the same manner with one exception. The stuck-out line which goes to the apex is drawn dotted, while the high points, or ridges, which separate these triangles that are sliced away, are shown as solid lines.

Perhaps you will notice that the dotted lines in the design at *C* in Figure 4 are longer than the blade of the sticking-out knife. This makes it necessary to drag the knife downhill from point *D,* the deep point, to *C,* which is on the surface of the wood.

If you have completely mastered the above instructions you are experienced enough to carve designs. Naturally, now you will need a pattern to go by, so why not originate one of your own? The making of new and original designs helps to prove this craft to be as interesting as the actual carving itself.

The simplest method of starting your own pattern is in the following manner. First draw a rectangle 2½ by 1½ in. Within this figure draw its diagonals. After finding the midpoint of each side, draw lines connecting these four points. Also draw perpendicular lines connecting each set of two opposite points. When this is completed, you have a master figure from which you may erect triangles in any given symmetrical pattern.

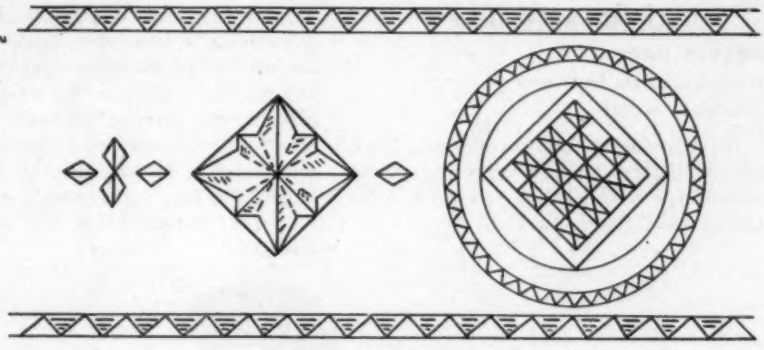


Fig. 5. A sample design

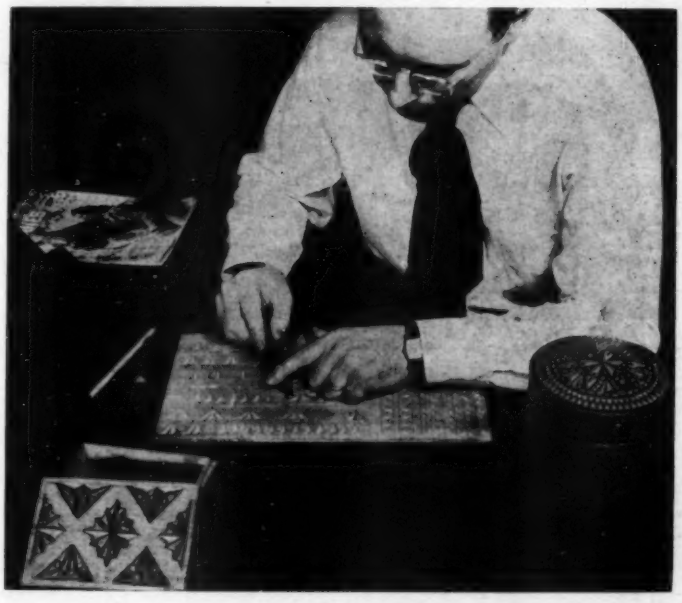


Fig. 6. Chip carving

There are numerous useful articles which can be hand carved for the home. Not only will they be in good taste but add a touch of charm to their surroundings. Among the most popular projects are cigarette humidors, picture frames, coffee tables, and sewing boxes. Many carvers have found that such unusual items make wonderful gifts for the holiday season.

Before closing, a few additional hints will be given in order to assist the amateur chip carver. When the article is carved it is necessary to erase all pencil lines with a gum eraser. If you don't, these dark marks will surely show through and smudge the clear-cut effect you desire.

After erasing, the project is sanded lightly with No. 3/0 sandpaper and wiped with a cloth. The final touch is to apply a good oil stain with a brush to color the carving. After this is thoroughly dry, rub the uncarved surface again with the sandpaper to remove all tiny splinters. To complete the project a good quality floor wax is applied with a brush, using a circular motion. After a ten minute wait, the article is next brushed with a horsehair brush until it shines. Repeat the waxing procedure several times as soft woods absorb wax.

Chip carving, thus briefly described, is well worth investigation by anyone wishing to have a leisure time activity. It is a clean, neat hobby which is extremely absorbing to both men and women. Once you have become fully acquainted with it, you will agree that with chip carving you can literally carve your cares away.

GIMP REEL BOX

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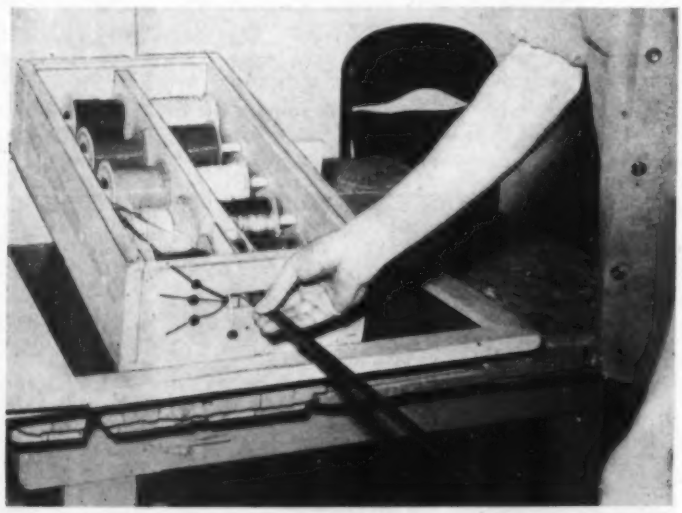
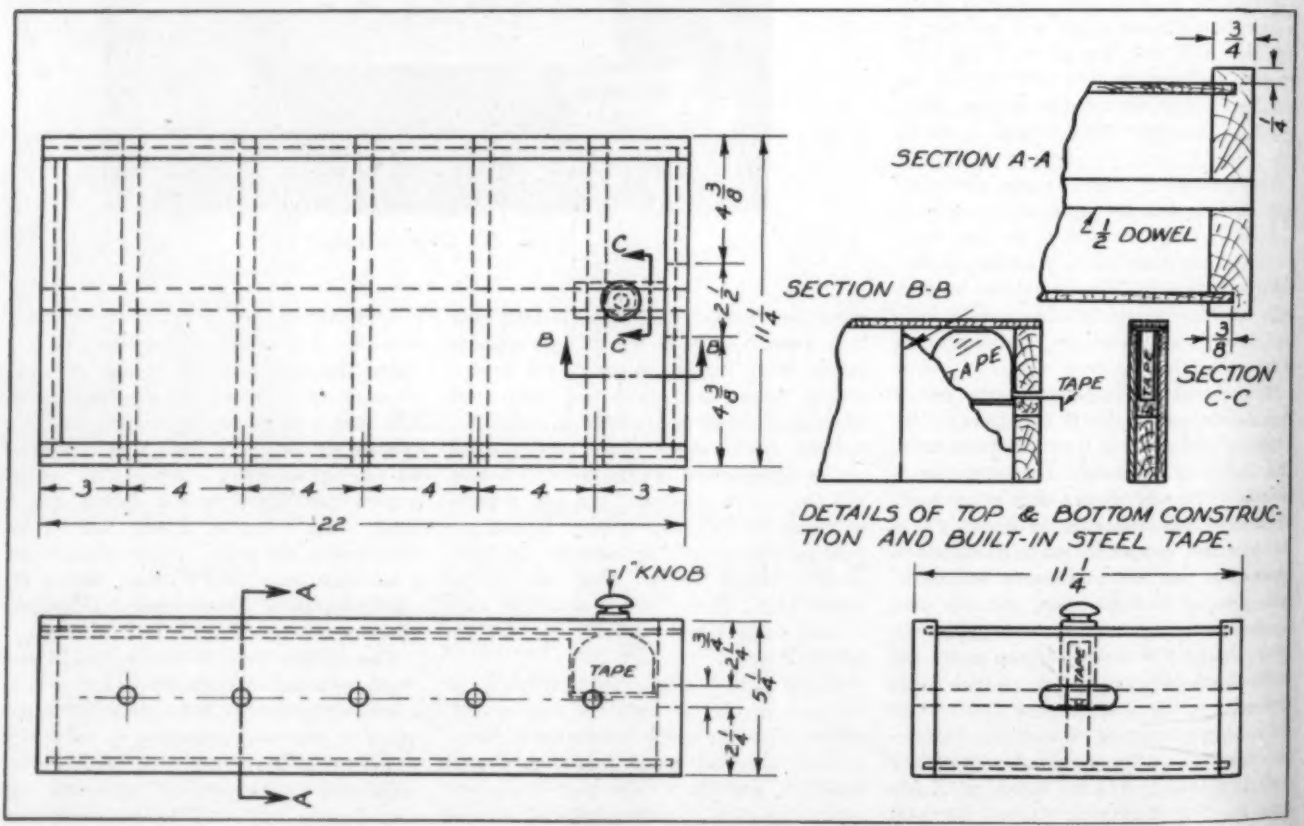
Industrial Arts Instructor
Choteau, Mont.

If you are doing gimp weaving, gimp braiding, or leather lacing, whether in a home workshop or a school shop, you will find this box an added convenience.

The built-in steel tape is not only always at hand, but it saves time. You simply place the end of the gimp that you select even with the end of the tape and extend the tape unreeling the gimp at the same time. The numbers on the tape can be easily read, enabling you to cut the gimp at the desired length. The steel tape, being a spring tape, will recoil automatically. The box has a masonite lid that slides in grooves to close it, thus protecting the material from dust and preventing accidental unreeling.



Gimp reel box



Gimp reel box

STEEL OR ALUMINUM CANDLEHOLDER

HERBERT E. SWORDS
State Teachers College
Oswego, N. Y.

The candleholder described in this article is a project for the general-metal student. It is easily made as it only involves basic machine-shop operations.

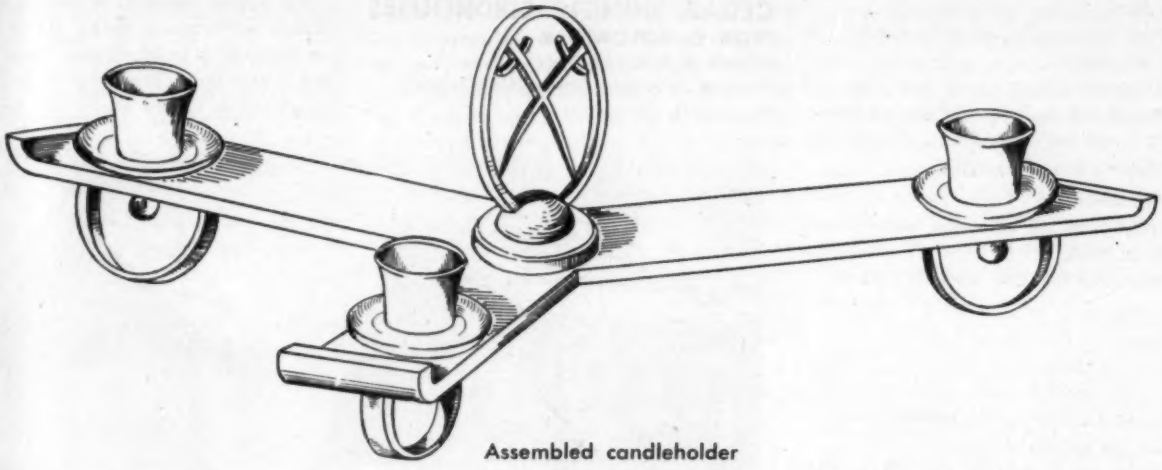
The student may design the center ornament according to his own taste.

Material suggested: aluminum or steel

Plan of Procedure

Legs — Part 1

1. Saw stock 4 in. long.
2. File, mill, or grind stock to thickness and width.
3. Lay out 120-deg. angle.
4. Saw off corners.
5. Clamp three legs together and file or mill 120-deg. angle.
6. File or mill to length.



Assembled candleholder

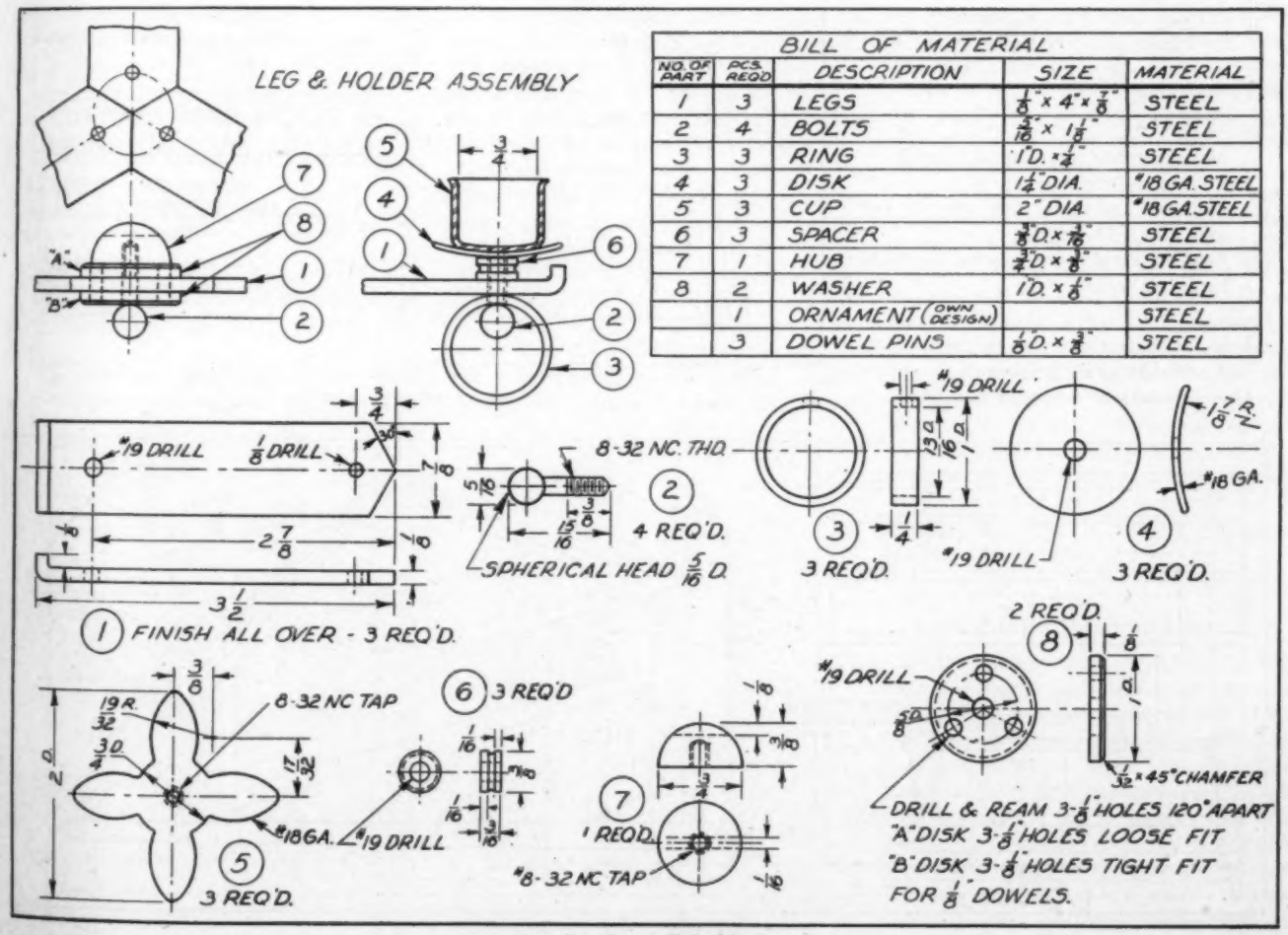
7. Lay out holes on one leg.
8. Clamp legs together and drill and ream holes.
9. Bend up ends.

Washers — Part 8

1. Cut off material for washers.
2. Turn 1 in. OD.
3. Chamfer one side.
4. Drill center hole using No. 19 drill.
5. Face other side to ⅛-in. thickness.
6. Assemble legs and transfer holes to washers.
7. Insert dowel pins into one washer (drive fit).

Bolts — Part 2

1. Turn threaded end of stock to .164 in. diameter, ⅝ in. long.
2. Thread diameter with No. 8–32–NC, ⅜ in. long, using stock and die.
3. Hold thread in lathe collet and turn spherical head.


LEG & HOLDER ASSEMBLY
BILL OF MATERIAL
NO. OF PART | PCS. REQD | DESCRIPTION | SIZE | MATERIAL
1 | 3 | LEGS | 1/8" x 4" x 7/8" | STEEL
2 | 4 | BOLTS | 5/16" x 1 1/8" | STEEL
3 | 3 | RING | 1" O.D. x 1/4" | STEEL
4 | 3 | DISK | 1 1/4" DIA. | #18 GA. STEEL
5 | 3 | CUP | 2" DIA. | #18 GA. STEEL
6 | 3 | SPACER | 3/8" O.D. x 7/16" | STEEL
7 | 1 | HUB | 3/4" O.D. x 3/8" | STEEL
8 | 2 | WASHER | 1" O.D. x 1/8" | STEEL
 | 1 | ORNAMENT (OWN DESIGN) | | STEEL
 | 3 | DOWEL PINS | 1/8" O.D. x 3/8" | STEEL
#19 DRILL
1/8 DRILL
8-32 NC. THD.
4 REQ'D.
SPHERICAL HEAD 5/16 O.
3 REQ'D.
1 7/8 R.
#18 GA.
FINISH ALL OVER - 3 REQ'D.
8-32 NC TAP
19 R. 32
30°
#18 GA.
3 REQ'D.
6 3 REQ'D
1 REQ'D.
2 REQ'D.
1/32 x 45° CHAMFER
DRILL & REAM 3-1/8" HOLES 120° APART
"A" DISK 3-1/8" HOLES LOOSE FIT
"B" DISK 3-1/8" HOLES TIGHT FIT
FOR 1/8" DOWELS.

Details of candleholder

Hub — Part 7

1. Turn ⅜-in. radius on ¾-in. stock (use short piece).
2. Mill ⅛-in. slot in center, ⅛ in. deep.
3. Cut off hub in lathe to ⅜-in. thickness.
4. Drill and tap center hole (No. 29 tap drill, No. 8–32–NC tap).

Center Ornament

1. Design and cut ornament out of steel ⅛ in. thick.
2. Insert into hub and braze it in place.

Ring — Part 3

1. Turn 1 in. OD, 1¼ in. long.
2. Drill and bore ID to 1⅛ in., 1¼ in. deep.
3. Cut off ring ¼ in. wide (allow for finish).
4. Face each side individually on chuck.
5. Lay out center for hole.
6. Center punch and drill with No. 19 drill.

Spacers — Part 6

1. Turn ⅜ in. OD 1 in. long.
2. Turn grooves into each spacer, ⅛ in. wide, 1/32 in. deep.
3. Drill hole 1 in. deep with No. 19 drill.
4. Cut off spacers ⅛ in. wide.
5. Break corners on chuck.

Disks — Part 4

1. Cut out disks to 1¼ in. diameter.
2. Drill holes in center, using No. 19 drill.
3. Turn spinning chuck 1⅞-in. radius.
4. Spin disks.

Cups — Part 5

1. Make template according to drawing.
2. Cut out and file to shape.
3. Drill and tap center hole, No. 29 tap drill, No. 8–32–NC tap.
4. Bend up leaves to suit candles. Use ¾-in. hardwood dowel.

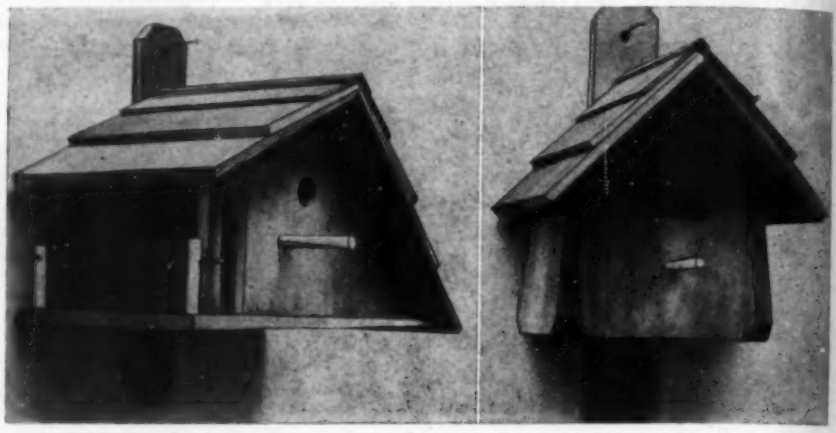
Finish

Legs and flat surfaces may be improved by a ball-peen hammered finish and the entire project finished with a coat of lacquer.

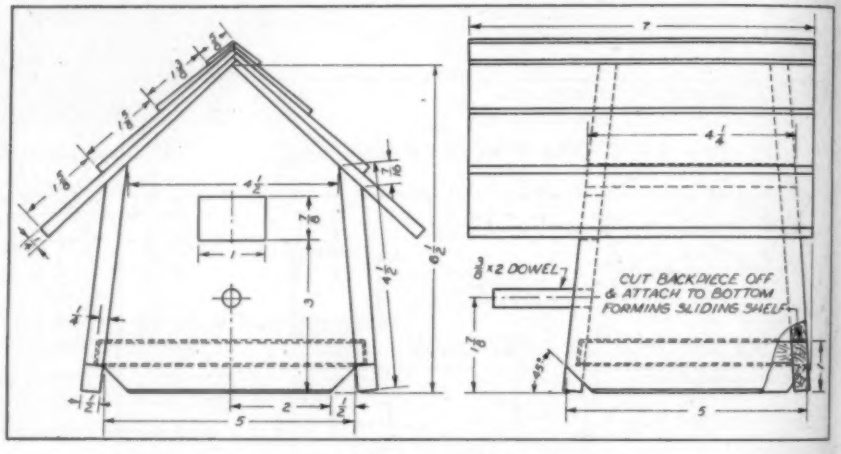
CEDAR SHINGLE BIRDHOUSES

PETER G. POLOWNIAK
Industrial Arts Teacher
Thomas Jefferson Junior High School
Passaic, N. J.

The age-old argument of painted versus unpainted birdhouses is quickly solved by building them out of cedar shingles. These certainly will attract birds. They may be finished with shingle stain, linseed oil, or left for the el-



Figs. 1 and 2. Cedar shingle birdhouses



Details of wren house

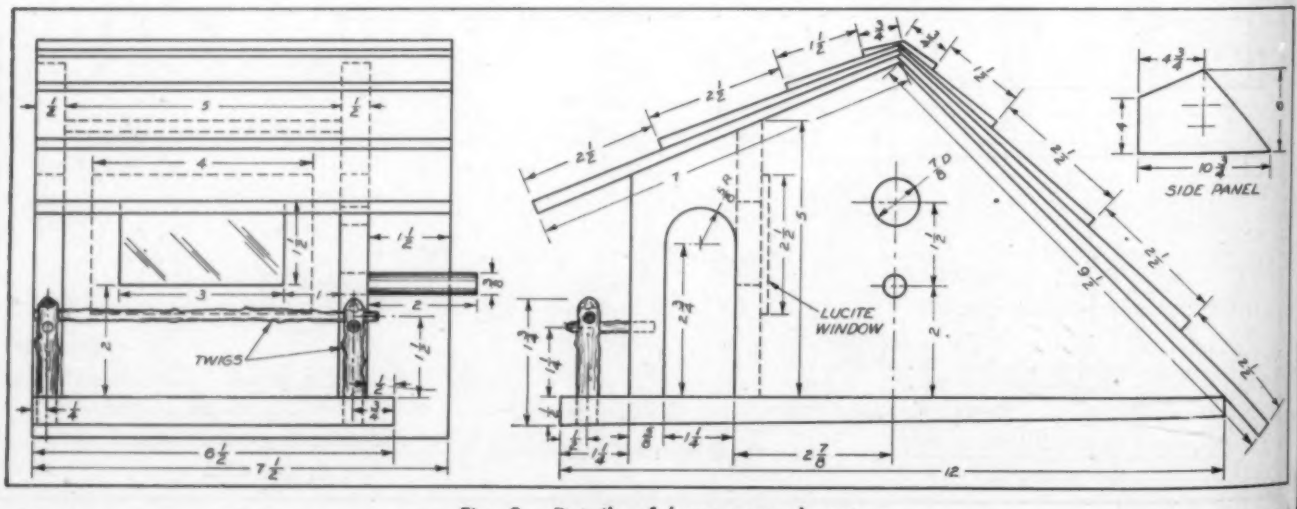


Fig. 3. Details of large wren house

ments and age to produce that natural weathered appearance.

Cedar shingle birdhouses have many advantages over those made from other materials. They are light in weight, weather proof, and the structure of the material is a natural insulation against extremes in weather.

The two wren houses shown in Figures 1 and 2 are examples of the possibilities in creative design. When designing a birdhouse, the tapered thickness of the shingle should be used advantageously to blend in with the design.

In the accompanying drawings the thickness is not indicated inasmuch as shingles taper and may vary in thickness. The birdhouse shown is put together with waterproof glue and brass escutcheon pins. For additional comfort ventilation holes may be drilled in the back and front pieces near the ridge. Birdhouses should be cleaned after the tenants leave. In order to facilitate cleaning the bottom of the birdhouse in Figure 1 has been fastened with brass screws and the one in Figure 2 was made to slide in and out like a drawer.

Shingle birdhouses make interesting projects for the shop classes as well as good assembly and detail drawings for the mechanical drawing classes.

CUTTING 4200 HOLES IN PAPER IN TWO MINUTES

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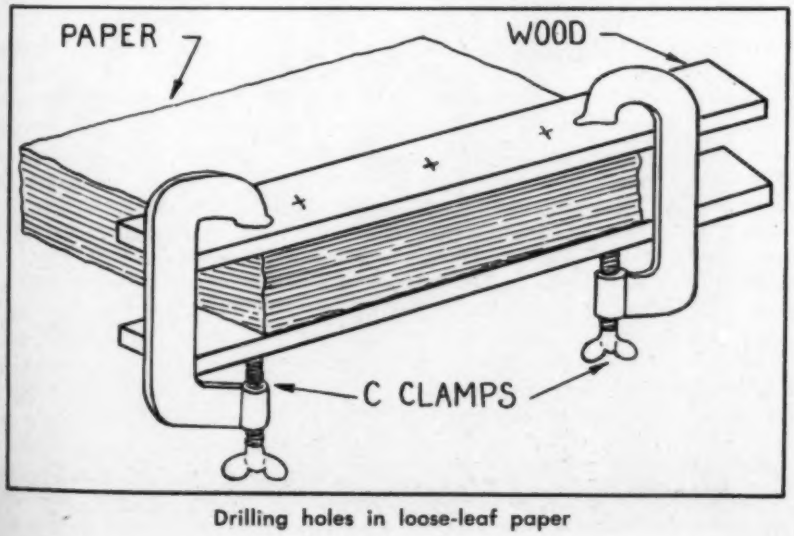
Industrial-Arts Consultant
Kensington School
Great Neck, N. Y.

The need of putting looseleaf ring holes in 1400 pages was solved in the following manner:

The 1400 pages were stacked and placed between two pieces of ¾-in. scrap wood, as shown in the accompanying sketch. This whole assembly was then clamped in place at each end with *C* clamps and the holes were marked and drilled with a ¼-in. drill bit on the drill press, drilling right through the wood and paper together. The wood keeps the papers from lifting up when drilling.

The drill bit was inserted and removed five times, in order to allow the paper to escape easily from the flutes of the bit. The three holes were completed in less than two minutes, and totaled 4200 individual holes. The faster the drill speed, the cleaner and more clear cut the hole will be.



Drilling holes in loose-leaf paper

THE DRY-POINT ETCHING PROCESS

EMERSON WILLIAM MANZER
State Teachers College
Platteville, Wis.

Dry-point etching is a phase of the graphic arts. These etchings are made on a plate of copper or celluloid with the aid of a properly pointed steel tool. The intaglio or scratched lines made on the plate are filled with ink and the etching printed on prepared paper by means of an etching press. The art of etching, it is thought, was learned from the armorers and goldsmiths of Florence in the fifteenth century. One of the most renowned of these great craftsmen was Benvenuto Cellini, who, at the age of fifteen was apprenticed to a goldsmith. Much of our early progress in the field of printing can be attributed to the workers in precious metals.

The practice of ornamenting armor and swords with etched designs predates the oldest printed etchings. The goldsmiths or armorers filled the engraved lines, created by a tool called the burin, with a black enamel made of silver, lead, and sulphur. This method was called *niello*. The experimental nature of some craftsman brought about the discovery of printing from engraved lines. It was discovered that if the engraved lines were filled with ink and then pressure was applied to the engraved metal, while it rested on a sheet of paper, a printed outline of the engraved lines was produced. Since the lines were cut by pushing the burin by hand power, the resulting print would be called an engraving, but it was the forerunner of the dry-point method of making etchings.

The exact date of this discovery is not precisely known but authorities attribute 1456 to 1463 as the possible date. A Swiss engraver, Urs Graff (1485–1527), is credited with printing an etching in the year 1513. Among etchers of the sixteenth century was Albrecht Dürer (1471–1528) of Nuremberg, Germany. Recently a collection of his etchings was displayed at the Museum of Art in Chicago. It was the writer's good fortune to see and study the etchings of this great master.

Most of the master painters of the seventeenth century, chiefly Rembrandt Harmens van Rijn (1606–69), whose 200 and more etchings earned for him the title "Father of Etching," and Sir Anthony van Dyck (1599–1641) of the Dutch Netherlands produced many great etchings. The eighteenth century found the art in Italy and Spain where the noted Spanish artist Francisco Goya (1746–1828) produced his master etchings, principally his "Horrors of War."

Naturally a new art of this form found its way into other countries and history tells us that the artists of England and France produced etchings of some repute, but not of the quality of the great Dutch artists. James McNeill Whistler (1834–1903) produced a number of outstanding etchings that brought him great fame. Although born in America, Whistler did practically all of his work in England. In our own country many etchers of note produced some etchings worthy of a place in our art museums. Joseph Pennell, whom the writer had the great pleasure of meeting, won himself a niche in the hall of contemporary etchers.

What Is the Dry-Point Process?

Of the many varieties of etching the most adaptable for use in schools is the dry-point process. It is considered best because of the low cost of materials involved, and the simple tools and techniques used. Drypoint means the creation of the necessary lines on the plate without the use of an acid. It simply means the scratching of lines of variable depths and widths on the smooth surface of the plate medium with a sharply pointed steel tool called an etching needle. Since celluloid is cheaper than copper and readily

available, easier to mark or scratch, this article will deal with celluloid as the plate medium. Another important factor in favor of this medium is its transparency which permits the etcher to see and follow the lines of his drawing or subject being etched on the plate.

Tools and Techniques

Etching needles may be made from old or broken dental tools which are obtainable, in most instances, without cost. All that is needed to transform the dental tools to etching needles is to grind a new point, using a smooth emery wheel and avoiding the burning of the point. A wrapping of masking tape will enlarge the size of the tool and thus make it much easier to hold. Several sizes of needle points are necessary to produce lines of various widths and depths. A long sharp steel point will produce fine lines, while a point with a wider angle will produce strong lines. The needle points must be kept sharp in order to make lines of quality and also produce a "burr."

Dry-point etching depends upon the burr that is created by the action of the etching needle point. It is a rough ridge pushed up by the removal of the material. The mount of burr can be regulated by the pressure and the angle at which the needle is held. A point ground to an angle of 45 degrees will raise a burr on each side of the line and thus produce a heavier etched line. If the burr is not wanted on some lines or parts of a line, it may be removed by lightly scraping with a sharp tool along the line. A pin scratch will print a line. The ink is held against the edges of the burr and this gives width, depth, and quality to the line when it is printed.

A good dry-point etching depends on a variation of line width and tone. Tone is produced by the closeness of the lines and by crosshatching the lines. The study of a good pen and ink drawing will disclose the methods used by the artist to obtain light and shade in his work. By using a good magnifying glass the work of good etchers may be studied for line quality, tone value, and the general technique used. To start dry-point work it would be a good policy to make a test on a 2 by 3-in. piece of celluloid.* On this test piece make lines of various widths and depths, several patches of crosshatched lines, and a small portion of the work that will be etched. Ink this test piece and discover how your lines will print.

Much freedom should be expressed in making the lines. Too much pressure on the etching needle will make it hard to control. Outline the work lightly and then go over the lines that require more depth and width. Mechanical methods have no place in this type of art work. Keep the points of the steel needles sharp and with proper angles. Several tools will be required so it will not be necessary to stop to sharpen the points. A small oilstone will help keep the points in shape.

Etchings of good quality depend very much on other important factors: the quality of the paper used, kind and color of inks, type of press and press blankets, proper drying of prints, and the proper mounting of the finished prints. Each of these factors will be

*Celluloid can be obtained from American Handicrafts Co., Inc., 45–49 So. Harrison St., East Orange, N. J.

described in detail so that the process of dry-point etching will be so intriguing that the reader will want to *try his hand* in this interesting and fascinating phase of the graphic arts. The thrill one receives when the first proof or *state* is pulled is compensation for all the effort and care given to the creation of the first etching.

Kind and Preparation of Paper

Since the ink deposited in the intaglio or incised lines must be transferred to the surface of the paper, it is necessary to use conditioned paper of a soft texture. Eggshell book paper of an off-white color is very receptive to the ink and therefore is good etching paper. Special etching paper may be obtained from graphic arts supply firms. Handmade Japanese paper of a medium weight, is excellent and should be used for printing advanced dry-point plates.

Conditioning the paper means that each sheet of paper has been *soaked* in water. The paper should be cut larger than the plate so that there will be sufficient room for placing the paper on the plate. After each sheet has been soaked it is placed between sheets of blotting paper and then the stack is weighted with two heavy sheets of metal. The *damp book*, as it is now called, should be wrapped in oilcloth, oil paper, or cellulose paper so that the paper will not dry out at the edges. Etching paper should be conditioned at least 12 hours prior to the printing of the sheets.

Preparation of the Etching Press

Some schools have been fortunate in obtaining a used lithograph press from an old printing firm. The cost in some instances has been only the removal expense. The etchings shown in this article have been made on a stereotype mat press which is also used to make mats of various type forms. The cost of such a press is within the range of most schools and from the latest information they are now available. Graphic arts supply firms have special etching presses.

The etching-mat press is made up of a base, a traveling plate, and adjustable steel roller. The roller can be raised or lowered by bearing adjustment screws at each side. The traveling plate moves on a rack powered by two long handles attached to the drive gear. To prepare the mat press for printing the etched plate, it is necessary to place a piece of ¾-in. plywood or a mounted half-tone plate on the traveling plate. On top of the plywood or mounted engraving place a sheet of 90 or 100 pound coated book paper or a sheet of tag board paper. On this clean, flat sheet of paper, place your inked test plate, face upward. On the plate to be etched place a sheet of the damped paper from the "damp book." Over this sheet of damped paper place a piece of blotting paper. The two felt blankets are now placed over the papers and plate. Felt must be used because of its *give* when under pressure. Adjust the press roller so that equal pressure is applied over the entire surface of the plate. Much pressure is required to produce a good etching. When the test piece prints well the inking and printing of the dry-point plate is the next step.

Inking the Celluloid Plate

Here we come to a very important factor in the making of good etchings. However, before the plate can be inked we shall need several tools and materials. We shall need an 8 by 10-in. sheet of double strength or ¼-in. plate glass for mixing the ink; an ink spatula or palette knife; a small electric plate for heating the celluloid plate so that the ink will be warm; a supply of stiff muslin or mosquito netting for wiping off surplus ink; a supply of soft washed rags that are lint free; a supply of ink remover such as kerosene; a can of "easy-wipe" compound; a can of plate oil (burned linseed oil); a supply of clean, washed organdy for producing the final touch of the plate, called *retroussage*.

Special etching inks are available in small tube containers from graphic arts supply firms. Regular printing ink has been successfully used. A warm black, dark brown, and dark blue will produce prints of good tone. Dead black is not considered good for etching. A small amount of *easy-wipe* or plate oil will thin out the ink so that it will print easily and can be easily wiped off the celluloid plate. Inking the plate is done with a special tool

called a *dabber*. It can be made from a piece of ¾-in. dowel rod about 4 in. long, a disk of ⅛-in. hard board about 2 in. in diameter, a small screw and washer to hold the hard-board disk to the dowel handle. Over the hard-board disk make a thick padding of cotton or lamb's wool. Cut out a large circle of muslin cloth and wrap the cloth over the padding and tie the surplus to the handle. When ink is applied to the dabber by pressing the pad on the inked glass plate, the ink is transferred to the celluloid etching plate by dabbing or pressing the inked surface into the scratched lines. A rocking motion of the dabber aids in getting the ink into the lines and also protects the "burr" of the lines.

Now that the ink dabber is ready a ribbon of tube ink 1 in. long, is squeezed onto the glass plate and spread out smoothly with the palette knife or spatula. Rock the dabber on the ink and transfer the ink to the lines of the warmed celluloid plate. The excess ink will naturally cover the smooth surface of the plate and therefore must be removed else it will print. The excess ink is wiped off the plate with pads of mosquito netting. The stiff cloth will not remove the ink from the lines. Soft cloth would absorb ink from the lines and make parts of the etching weak. Use a rotary motion. Do not press too hard, and not across the lines.

After wiping with the stiff muslin there will be a thin film of ink left on the surface of the plate. This film is wiped lightly with the washed and dried organdy cloth. The wiping or toning of the plate is called "retroussage." It is a characteristic of all etchings of quality. Some etchers prefer to finish the plate by wiping the flat surface with the fleshy pad of the hand or thumb.

When the plate has been properly inked and is ready for an impression, it is placed on the traveling plate of the etching press and printed. It is now that the etcher awaits the results with much anticipation and tense excitement. The first proof may result in much satisfaction or much disappointment. This is part of the adventure. Whatever the result, the print must be examined carefully for tone and line quality, for even pressure of the press, and for the addition or subtraction of lines to make the print better. Each subsequent print must be preceded by the entire inking and wiping process.

Drying and Mounting the Print

The damp print must be dried very carefully in order to keep it flat. This is done by placing the print, face up, on a flat surface and taping it down by placing small strips of masking tape at the four corners. Each print must be numbered as it comes from the etching press. This number can be placed at the bottom of the print for the time being. After the prints are dry and the total number printed is known the print number is placed at the lower left of the print, just under the plate impression. This number will show the print number and the number printed. For example 4/25 means that the print is the fourth of twenty-five prints made. To the right of the print number is placed the written name of the etcher. The number and the name are always written in pencil.

When the print is dry it should be mounted which means framed with white mounting board. The reason for mounting prints is two-fold. It aids in the handling of the prints and prepares them for framing under glass. Proper mounting requires attention to some specific details if the job is to be done properly. In the first place, etchings are never pasted to a surface. They should be attached to a mount board with a pair of small hinges made of masking tape and placed at the top. This permits the print to shrink or expand at will according to the condition of the atmosphere of the room. Over this back board is placed a ⅛-in. matt board of equal size which has a beveled-cut opening large enough to show the print mark edges and the markings below the print. The reason for placing the etching back of the ⅛-in. matt board is to protect the etching from any moisture that collects on the inside of the glass. If the print is placed next to the glass it would absorb moisture and soon become stained. Matt board or mounting boards may be procured from any store that does picture framing. Off-white color is best for most etchings.

Proper mount margins are essential. The bottom margin should be the widest, the top margin narrower than the bottom but greater than the side margins which should be equal in width. Small etchings may be placed in a fairly large mount. The center of a print should never be below the optical center of the mount. The optical center is above the geometrical center. A ratio of 5-4-3 will make a good mount margin.

The dry-point celluloid etchings shown in this article were made by students during a six weeks' course in etching which is a phase of the graphic-arts program. The subjects are not originals but by doing the etchings each student had experience in the process, did some related reading on the subject, and had the satisfaction of doing an etching and pulling a number of prints. With this experience as a background it is hoped that many original creations will come from their etching needles. We learn by doing.

Bauxite, the ore from which aluminum is extracted, was first found in the United States in 1883 near Rome, Georgia.

SAFETY IN THE PRINT SHOP

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Students in the print shop must know the conditions and practices which may cause injury. All workers in the shop must observe certain general precautions and follow certain safety rules which govern the safe operation of the various machines in the shop.

The writer obtained the following material on print shop safety in interviews with several instructors who have had many years of experience in teaching printing. He secured additional material from other sources.[1]

Some General Precautions

1. When the instructor is not in the room, the machines must not be operated.
2. While the machine is in operation, do not make adjustments on the machine.
3. Before the student may operate a machine, he must obtain the instructor's permission.
4. After the machine has been used, always shut off the power.
5. Never put type or other printing materials in your mouth.
6. Do not talk to anyone who is operating a machine.
7. To avoid being caught in moving parts of the machine, have clothing securely fastened. Do not have dangling ties and sleeves.
8. To avoid possible lead poisoning, wash your hands after you have handled type and other printing equipment.
9. When cleaning materials for type and for the press, exercise caution. These cleansing materials are usually flammable.
10. Keep floors free of wastepaper, etc.
11. To avoid infection, sterilize cuts received from the sharp edges of paper.

Safety Relative to the Operation of Individual Print Shop Machinery

The Platen Press

1. When a sheet goes below the guides, never attempt to take it from the platen.
2. Do not reach for a sheet that has fallen between the feed board and the platen or the impression screw.
3. When a sheet falls under the press, do not take it out unless you stop the machine.
4. Permit no one within the press circle

[1]David Borth, Instructor of Printing, Rock Island High School, Rock Island, Ill., 1938. Charles Kittleson, Instructor of Printing, DeKalb Township High School, DeKalb, Ill., 1938. *Manual of Safety Instruction for Vocational and Industrial Arts*. The Fine Arts Press, Santa Ana Senior High School, 1937, pp. 17–20. E. Petri, *Safety Rules for the Print Shop*, Industrial Arts and Vocational Education, Vol. 26, Sept., 1937, pp. 288–289.

except the person feeding the press and his helper while the press is in operation.

5. Set speed of press so that you can feed it safely with little or no waste.

6. When someone else is feeding the press, keep away from the feed board.

7. When the press is in motion, do not adjust the gauge pins.

8. Never attempt to run the machine by hand from the rear of the press.

9. While the press is in motion, do not attempt to put on rubbers or grippers.

10. When the press is in operation, do not oil or wash it.

11. Do not try to feed very small or odd-shaped sheets.

12. Do not reach for falling sheets.

The Cylinder Press

1. When the press must be run by hand, do not place your hands on large pulley. Always turn it over by working the flywheel.

2. Do not oil the press while it is in motion.

3. Do not wear loose clothing when working around the press.

4. Before you start the press, be certain that the chase is tight.

5. When the press is in motion, never attempt to make adjustments.

6. Do not feed the press too fast.

The Linotype

1. Do not attempt to adjust mats in the assembler until line carriage has returned to position.

2. Keep hands away from moving parts of the machine.

3. Keep moisture away from the molten metal.

4. Never plunge a cold skimmer into molten metal.

The Paper Cutter

1. No student may operate the paper cutter except under the immediate supervision of the instructor.

2. Students must not remove the knife from the cutter.

3. The paper cutter requires only one operator. It is extremely dangerous for one person to handle the stock while the other pulls the lever.

4. When cutting, place both hands on the lever.

5. Never attempt to place one hand against the paper and then pull the lever with the other hand.

6. When operating the small table cutter, work alone.

The Stitching Machine

1. Never place your fingers under the shoe.

2. When the machine is in operation, never place your hands on any movable parts.

3. When lining up paper in the machine, remove the foot from the operating pedal.

The Saw

1. When the machine is being operated, the top guard must always be kept down over the saw.

2. The machine should be used only by students assigned to it by the instructor.

3. Do not attempt to remove scraps near the revolving saw with the fingers.

4. Never place the hands in line with the saw blade.

5. Before cutting, make sure all slugs to be cut are securely clamped to the fence.

Type and Type Cases

Type metal is poisonous. Never put type in your mouth. After working in the print shop, always wash your hands carefully before you handle food.

The safety precautions necessary in the print shop are those listed in the forepart of this article. They are the rules which govern the safe operation of the various print shop machines, such as the platen press, the cylinder press, the linotype, the paper cutter, the stitching machine, the saw.

The value of shop cleanliness in the maintenance of safety is important. Keep all oily and dirty rags in proper fireproof receptacles and keep the floors and passageways clean of oil and of all obstructions.

CUP CENTER

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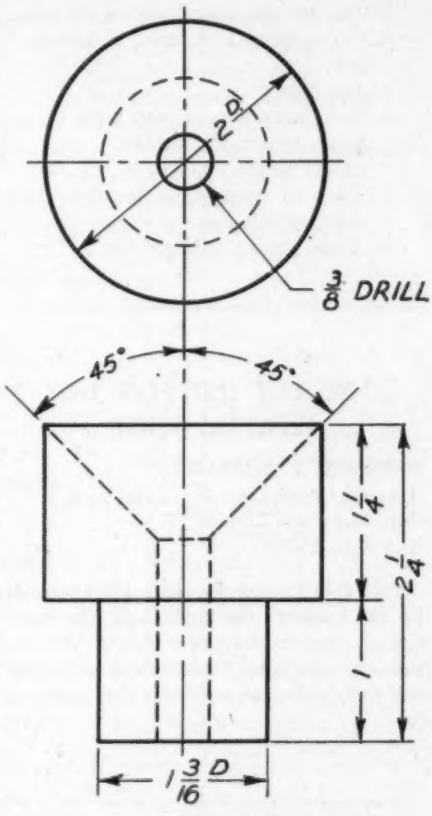
Quite often students have difficulty in choosing a project which is both useful and helpful in learning the first fundamental operations to be performed on the lathe. To assist them they must be guided very carefully in their choice of project so that they may be able to secure the proper training during their course in machine-shop work.

The cup center which is described in detail in this article has proved very useful and helpful to the student in turning out such a project. The student may design a project similar to this providing the base or collar of this project remains the same diameter in order to be able to use it in any drill press.

This cup center can be used very easily on any drill press by merely placing it into the table of the drill press. The large shoulder of the cup center then enables it to support the work and hold it very accurately without having to clamp it to the post of the drill press. In addition to many basic operations involved in making this project the student can carry it on through to the process of taper turning while the stock is held in the universal or independent chuck.



Cup center

Tools, Equipment, and Machines

Steel rule, scriber, center punch, hand or power hack saw, combination square, machinist's vise, cup center or center drill, drill press, ⅜-in. straight shank drill, machine lathe with cutter bits and accessories, files, outside calipers, micrometer, emery cloth, cutting oil, and other minor tools and supplies.

Materials Needed

1 piece of cold rolled steel, round, 2 by 4 in. File, emery cloth, cutting oil

Plan of Procedure for Making Cup Center

The student should have the approval of the instructor after making his drawing before undertaking the project. He should be well informed and able to operate the lathe very well in order to perform the various operations.

1. Check drawing.
2. Make out a bill of material.

3. Plan the procedure for doing the job.
4. Cut to length with power or hand hack saw.
5. File ends.
6. Lay out work, using steel scale, combination square, and dividers.
7. Center ends.
8. Place on center in lathe; drive with common lathe dog.
9. Adjust proper spindle speed.
10. Set lathe tool for facing.
11. Turn stock end for end between centers.
12. Face end to length according to drawing.
13. Turn base down to 1 3/16 by 1 in.
14. Place base section in universal or independent chuck after shoulder is finished.
15. Set compound rest at 45 deg. to turn taper on top side of cup center.
16. Drill ⅝-in. hole through center of piece.
17. Turn work to micrometer size.
18. Polish work with emery cloth and cutting oil.

Upon completion of these operations the student should have a very definite knowledge of many essential operations involved in making this project. The work should all be very accurate with a + or — .001 tolerance and all operations performed in the proper sequence.

PROJECT LIST FOR THE ELECTRIC SHOP

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Project lists can be of considerable assistance to the student confronted with the problem of what to make as a project. The student can check over the list and will generally come across several items that appeal to him. A consultation with the instructor will bring out the most feasible job.

In making a final job selection the instructor and the student should take into consideration the usefulness, need, difficulty, and interest value. Care must be exercised to determine whether the shop made object will satisfy all four characteristics. Any job failing to satisfy any one characteristic will fail to be educationally sound. An object may be useful and may be needed by the student or shop but may involve operations that the student is unable to do.

When a final selection has been made, the teacher may either resort to his own files, magazines, or books for plans. If no plans are available, the teacher may have to help the student work out an original design. In the process of developing a good design for the object the student and teacher should ask a number of questions. Is the object in good taste? Is it properly proportioned? Is the construction based on sound principles? Will it have that *professional* look?

The following is a list for the electric shop that has evolved over a period of several years. All the items have either been made in classes or can be visualized by the author.

Electric Shop Projects

Agitator, darkroom
Airplane, static
Alarm, burglar
Alarm, fire
Ammeter
Ammeter, hot wire
Amplifier, audio frequency
Amplifier, one tube a.c.-d.c.
Amplifier, radio frequency
Arc lamp
Arrester, lightning
Autotransformer

Ballast, fluorescent lamp
Beam, talking light
Bender, plastic
Bell and buzzer board
Bell, brake drum rotary
Bell, portable electric
Boat, phono needle
Brazer, band saw
Bridge, capacity
Bridge, Wheatstone
Brooder, chicken
Burner, wood
Buzzer, a.c.
Buzzer, a.c.-d.c.

Candlelight
Capacitance decades
Cell, flashlight
Cell, photronic
Charger, battery
Charger, flashlight cell
Charger, trickle
Chimes
Chimes, motor operated
Circuit board, series and parallel
Coil, induction
Coil, jumping
Coil, magnetizing
Coil, Tesla
Compass
Compass, automobile
Control panel, model railroad
Cord, extension
Cow prod

Demagnetizer
Detector, grid leak
Dimmer
Dip needle
Door opener, garage
Drawing board, bottom illuminated
Driver training board, magnetic
Dryer, hair
Dryer, photoprint

Earphone
Electrocuter
Electromagnet
Electrophorus
Engraver
Examination board

Fence, electric
Flasher, signal
Flashlight
Float, illuminated for fishing
Furnace, arc
Furnace, melting (nichrome)
Furnace, soldering

Galvanometer
Gate, railroad crossing
Generator, demonstration a.c.
Generator, demonstration d.c.
Gong
Groover, tire

Heater, bathroom
Heater, radiant
Heater, reflector
Helix, magnetic field
Hot plate
House numbers, illuminated

Intercom set
Indicator, battery electrolyte level
Indicator, wind velocity

Key, telegraph

Lamp, bed
Lamp, desk
Lamp, dressing table
Lamp, dry cell
Lamp, emergency
Lamp, floor
Lamp, fluorescent desk
Lamp, fluorescent demonstration
Lamp, fluorescent shop
Lamp, incandescent
Lamp, inspection
Lamp, magic
Lamp, photoflash
Lamp, porch
Lamp, portable
Lamp, post
Lamp, radio frequency fluorescent
Lamp, reading
Lamp, stroboscopic
Lamp, table
Lamp, test
Latch, door
Light, auto timing
Light, bow tie
Light, darkroom safe
Light, flood
Light, shell night
Light, spot
Lock, combination

Magnet, lifting
Marker, metal
Memo board, magnetic
Meter dial, kilowatt-hour
Meter, iron vane
Microphone
Microphone, wireless
Mohammed's coffin
Motor, a.c.-d.c.
Motor brake, electromagnetic
Motor, induction
Motor, reciprocating

Motor, series wound
Motor, synchronous
Multiple switch hookup
Music box, electronic

Nitelite, neon

Ohmmeter
Oscillator, code practice
Oscillator, wireless phonograph
Oscilloscope
Oven
Oven, radiant

Phonograph
Photo cell outfit
Pickup, phonograph
Pith balls
Popper, popcorn
Power supply (for detector-amplifier)
Power supply (selenium rectifier)
Power supply (transformer type)
Printer, contact
Probelite
Projector
Pushbutton

Questioner, magnetic

Radio, crystal (capacitively tuned)
Radio, crystal (inductively tuned)
Radio hat
Radio, one tube regenerative
Radio, superheterodyne
Rake, electromagnetic
Rectifier, chemical
Reel, cord
Relay
Relay, capacity
Relay, photoflood saver
Relay, photoflood slave
Remote control, airplane
Repulsion ring
Resistance decades
Resistance unknowns
Resonance demonstration set
Rheostat
Roaster, hot dog

Score board
Sealer for frozen food bags
Sign, animated
Sign, back illuminated
Soldering copper
Soldering gun
Soldering tool (carbon)
Solenoid
Solenoid, camera shutter
Sounder, telegraph
Speaker, extension
Splice board
Spotlight
Sprayer, vibrator type
Star, Christmas
Steadiness gauge
Stove
Stove, plastic
Switch, automatic lamp
Switch, foot operated
Switch, photoflood saver
Switch, overload (magnetic)
Switch, overload (thermal)

Talking light beam
Telegraph, selsyn dial
Telegraph set (two buzzers)
Telephone hookup
Test set, emission
Tester, circuit and condenser
Tester, circuit (neon)
Tester, conductivity
Tester, continuity
Tester, flashlight bulb and battery
Tester, ignition
Tester, ignition and circuit
Thermocouple
Thermostat (bimetal)
Thermostat (wafer)
Thermostat, soldering iron
Timer, motor driven
Timer, photoprint (electronic)
Toaster
Transformer
Transformer, vari-volt
Trimmer, arrow feather

V-blocks, electromagnetic
Volta's pile
Voltmeter, multi-range
Voltmeter, slideback neon
Voltmeter, solenoid
Voltmeter, vacuum tube
Volt-ohm-milliameter

Warmer, bottle
Warning device, curb
Wattmeter
Weather vane
Welder, arc
Welder, spot
Windmill, static
Winker
Wire gauge

MEASURING WITH A RULER

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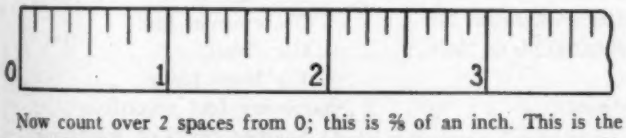
Unit No. 1

This is how a ruler looks that is divided into *8ths* of an inch. Count the number of *spaces* between 0 and 1. There are 8 spaces. Each space is ⅛ of an inch.



Now count over 2 spaces from 0; this is ⅜ of an inch. This is the same as ¼ of an inch. *Write* under the *line* next to the two spaces ¼.

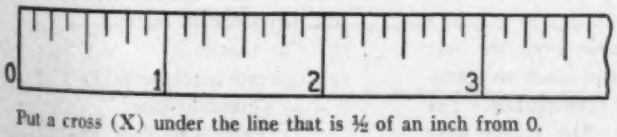
Now count over 4 spaces from 0; this is ⅝ of an inch. This is the same as ½ of an inch. *Write* under the *line* next to the four spaces ½.

Now count over 6 spaces from 0; this is ⅞ of an inch. This is the same as ¾ of an inch. Write under the line next to the 6 spaces ¾.

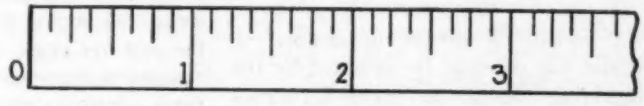
Now *start from 0* and label the (write under) —

1 — first line ⅛
2 — third line ⅜
3 — fifth line ⅝
4 — seventh line ⅞

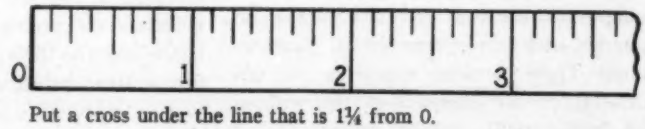
This is how you read a ruler that is divided into *8ths* of an inch. Do the work below.



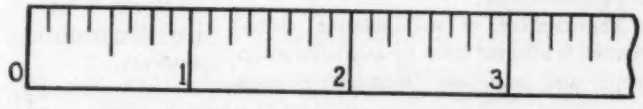
Put a cross (X) under the line that is ½ of an inch from 0.



Put a cross under the line that is ⅜ of an inch from 0.



Put a cross under the line that is 1¼ from 0.



Put a cross under the line that is 1⅝ from 0.

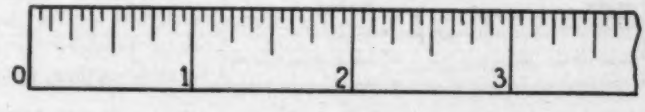
Draw a line with your ruler 1¼ in. long.

Draw a line with your ruler 2½ in. long.

Draw a line with your ruler 3⅝ in long.

Draw a line with your ruler that is 4⅞ in. long.

This is how a ruler looks that is divided into *16ths* of an inch. Count the number of spaces between 0 and 1. There are 16 spaces.

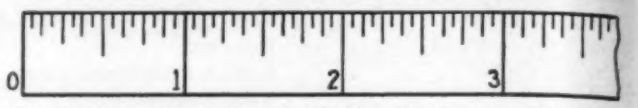


Each space is 1/16 of an inch. Now count over 2 spaces from 0; this is 2/16 of an inch. This is the same as 1/8 of an inch. Write under the *line* next to the two spaces 1/8.

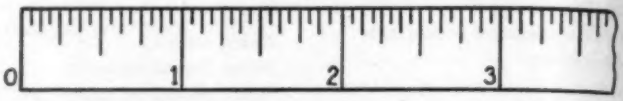
Now count over 4 spaces from 0; this is 4/16 of an inch. This is the same as 1/4 of an inch. Write under the line next to the four spaces 1/4. Now count over 6 spaces from 0, and this is 6/16 of an inch. This is the same as 3/8 of an inch. Write under the line next to the 6 spaces 3/8. Now count over 8 spaces from 0; this is 8/16 of an inch. This is the same as 1/2 of an inch. Write under the line next to the 8 spaces 1/2. Now count over 10 spaces from 0; this is 10/16 of an inch. This is the same as 5/8 of an inch. Write under the line next to the 10 spaces 5/8. Now count over 12 spaces from 0; this is 12/16 of an inch. This is the same as 3/4 of an inch. Write under the line next to the 12 spaces 3/4. Now count over 14 spaces from 0; this is 14/16 of an inch. This is the same as 7/8 of an inch. Write under the line next to the 14 spaces 7/8. Now count over 16 spaces from 0; this is 16/16 of an inch. This is the same as 1 inch. Now write under the line next to the 16 spaces, 1. Now start from 0 and write under

1 — the first line 1/16
2 — the third line 3/16
3 — the fifth line 5/16
4 — the seventh line 7/16
5 — the ninth line 9/16
6 — the eleventh line 11/16
7 — the thirteenth line 13/16
8 — the fifteenth line 15/16

This is how you read a ruler that is divided into *16ths* of an inch.



Put a cross under the line that is 5/16. Put a cross under the line that is 11/16.



Put a cross under the line that is 9/16. Put a cross under the line that is 1 3/16.

1. Draw a line with your ruler 1 1/4 in. long.
2. Draw a line with your ruler 2 5/16 in. long.
3. Draw a line with your ruler 3 5/8 in. long.
4. Draw a line with your ruler 2 11/16 in. long.

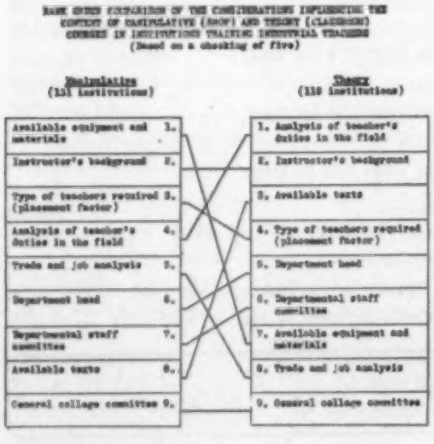
PREPARING AND UPGRADING INDUSTRIAL EDUCATION PERSONNEL

(Continued from page 225)

A variety of services in addition to regular day offerings are provided by the institutions. Besides the regular day school program, 38 per cent offer correspondence courses, 48 per cent extension courses on campus, 50 per cent extension courses off campus, and 38 per cent special examinations. These services, depending on circumstances, are offered with fee, without fee, with credit, toward degree, and/or toward certificate.

The content of manipulative (shop) courses is affected most by available equipment and materials, instructor's background, and analysis of teacher's duties in the field. The content of theory (classroom) courses is affected most by analysis of teacher's duties in the field, instructor's background, and available texts. Canvass as to the status of course offerings for the past five years, and the contemplated changes in course offerings in the next five years, showed a strong trend toward the adding of courses and away from the dropping of courses. This is more strongly evidenced concerning the shop courses than concerning the theory courses. Thus future prospective industrial-education teachers may be expected to pursue a broader range of preparatory courses in shop areas and, therefore, to have a better background for the interpretation of industrial life to their students.

(To be continued)


Manipulative
(151 institutions)
Theory
(110 institutions)
Available equipment and materials 1.
Instructor's background 2.
Type of teachers required 3. (placement factor)
Analysis of teacher's duties in the field 4.
Trade and job analysis 5.
Department head 6.
Departmental staff committee 7.
Available texts 8.
General college committee 9.
1. Analysis of teacher's duties in the field
2. Instructor's background
3. Available texts
4. Type of teachers required (placement factor)
5. Department head
6. Departmental staff committee
7. Available equipment and materials
8. Trade and job analysis
9. General college committee

CABINETMAKING INSTRUCTIONS BUILDING TRADES

(Continued from page 227)

smaller live work may be selected to add to the flexibility of the course. Suggestions are: (1) one section base kitchen cabinet, (2) one section upper kitchen cabinet, (3) basement screens, (4) small tables, (5) porch trellis, (6) utility doors, (7) shelving.

One of the eight basic live jobs was analyzed for the hand and machine operations involved in its construction. The sample outline follows. The others were analyzed in a similar fashion, but are not presented because of lack of space.

Making of Screens

1. Layout
   - *a*) Measure and divide spaces with a rule
   - *b*) Read a working drawing or blueprint
   - *c*) Check material when received
   - *d*) Lay out pattern on stock
   - *e*) Lay out for machines
2. Operations of tool skill procedure
   - *a*) Use try square
   - *b*) Set nail or brad
   - *c*) Use crosscut saw
   - *d*) Use chisel
   - *e*) Use block plane
3. Sharpening tool procedure
   - *a*) Sharpen chisel on whetstone
   - *b*) Sharpen block plane bit on whetstone
4. Cutoff saw (swing or radial) operations
   - *a*) Cut stock to length
   - *b*) Cut duplicate pieces
   - *c*) Operate machine safely
     1) Guard in place
     2) Table and floor clean
5. Circular saw operations
   - *a*) Rip stock to width
   - *b*) Cut tenons
   - *c*) Operate machine safely
     1) Guard in place
     2) Table and floor clean

6. Jointer operations
   a) Joint stock on edge
   b) Operate machine safely
      1) Guard in place
      2) Sharpen knives
7. Procedures of mortise machine operations
   a) Cut mortise
   b) Operate machine safely (keep hand away from chisel)
8. Assembly operations
   a) Read a rule
   b) Read a drawing
   c) Trial fit
   d) Test for squareness with a square
   e) Apply glue
   f) Use clamps
   g) Apply screening
   h) Apply molding
9. Operations in finishing
   a) Clean off excess glue
   b) Sand
   c) Prime

With respect to related technical information, emphasis should be placed upon the items found in Table 5.

PANTS OR SKIRT HANGER

M. F. BUSSEWITZ
Greenwood School
Waukegan, Ill.

The skirt or pants hanger, illustrated and described herewith, has proved very satisfactory as a beginning class project in the elementary woodshop classes. It fills the need for a project that is simple, inexpensive, and practical.

The holes are bored and the dowels are glued in after the spacers and bars have been glued together.

BUILDING TRADES

(Continued from page 242)

E. The instructor has developed practical teaching aids which make it easier for the students to understand the technical units of work.
F. The instructor has developed some checkup procedure so that the progress and ability of each student can be noted and assistance given to each student on his individual problems.
G. The instructor has analyzed and organized his technical work and developed methods of presenting the material so as to hold the students' interest.

One of the most expensive baby rattles ever purchased was the aluminum rattle bought for the son of Napoleon III. Its price in 1856, when aluminum was considered a precious metal like gold or platinum, was $3,200. Today, aluminum sells for 18 cents per pound.

ENGLISH FOR TRADE AND VOCATIONAL SCHOOLS

J. ALLEN MORRIS
Murray Vocational School
Charleston, S. C.

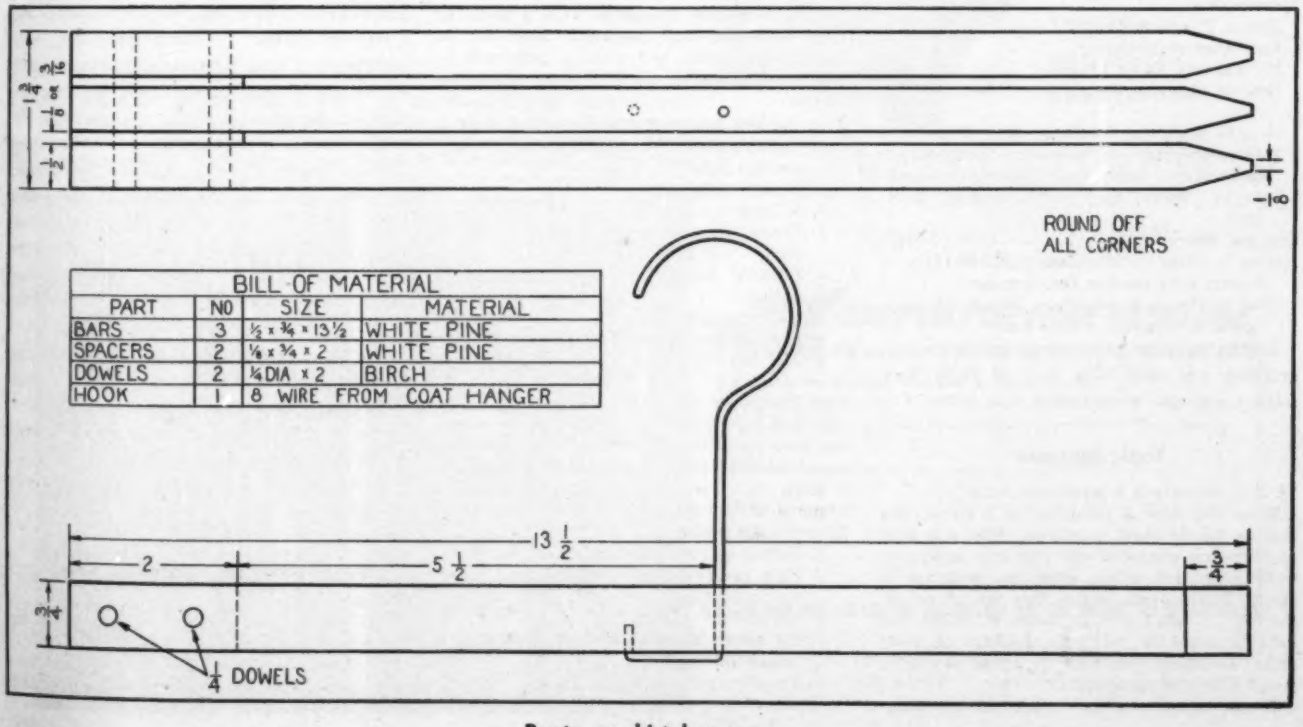
(See preceding articles in January, September, and November, 1948; January, May, June, November, and December, 1949; February and November, 1950; and February and March, 1951, issues.)

Themes for Vocational Students

Like swimming, typing, operating a lathe, adjusting a carburetor, splicing wire, or any other skill, writing can be learned in only one way: by writing.

Because most beginners in a vocational school have no idea how to select a suitable subject, organize paragraphs, and check their work carefully so as to produce an acceptable theme, they will not, at first, like to write themes. As their ability, knowledge, and mental maturity increase, however, they write, without much difficulty, respectable and sometimes excellent themes.

In my school, first-year students write short paragraph themes (approximately 100 words in length), averaging about one every other week. They are permitted either to make up their own subjects or to select them from a list of theme subjects. Such a list as the following can be quickly made and mimeographed, then used as needed:


ROUND OFF
ALL CORNERS
BILL OF MATERIAL
PART | NO | SIZE | MATERIAL
BARS | 3 | ½ x ¾ x 13½ | WHITE PINE
SPACERS | 2 | ½ x ¾ x 2 | WHITE PINE
DOWELS | 2 | ¼ DIA x 2 | BIRCH
HOOK | 1 | 8 WIRE FROM COAT HANGER
13 ½
5 ½
2
¾
¼ DOWELS

Pants or skirt hanger

Theme Subjects

General:
- Your City: Charlestown, S. C.
- Interesting Local Superstitions
- Items of Historical Interest: (The Battery, Fort Sumter, Fort Moultrie, etc.)
- Beauty Spots: (Hampton Park, Famous Houses, Gardens, Beaches, etc.
- Annual Azalea Festival
- Description of a Good Circus
- I Like to . . . (Beat Drums, Play a Trumpet, Lead a Band, Play Baseball, etc.)
- Jobs (The Best Job I Ever Had, My First Job, My After-School Job, etc.)
- My Hobby Is . . .
- My Narrowest Escape
- Some Snake Stories
- The First Time I Went to a Theater
- Things I Learned from Working as a . . .
- Trips (Fishing, Camping, Auto, Overnight)
- Why I Came to Murray Vocational School

Wood Shop
- Why Tools Don't Last
- Safety in the Woodshop
- How to Make (a Stenographer's Table, etc.)
- How to Operate a . . .
- How to Paint a . . .
- How to Use a . . .

Machine Shop
- How to Make (an Oyster Knife, a C Clamp, etc.)
- How to Operate (a Lathe, a Shaper, a Milling Machine, etc.)
- How to Be a Toolroom Attendant

Auto Shop
- Modern Safety Devices for Automobiles
- Advantages and Disadvantages of Autos
- Why Everybody Should Learn to Drive a Car
- Why I Would Buy a . . . (name of car)
- The Four-Stroke Cycle
- How to Start a Car
- How to Bleed Brake Fluid
- How to Change a Tire
- How to Back into a Parking Space

Electric Shop
- How a Telephone Works
- Some Uses of Electricity
- My Favorite Radio Program
- How to Make (a Crystal Set, a One-tube Set, etc.)
- How to Build (an Oscillator, etc.)
- How to Operate (a Tube-tester, a Switchboard, an Oscillator, Internal and External Growlers)
- How to (Solder, Tape, Splice, Connect Bells, etc.)

Drafting Room
- How to Make (a Blueprint, a Model Plane, a Poster, a Perspective Drawing, etc.)
- How to Use (a Protractor, a French Curve, a Spline, a Compass, a Slide Rule)

In the second year, special jobs on paragraphing are used. The first of these is a single-paragraph assignment:

Topic Sentence

"A *topic sentence* is a promissory note."

When you write a paragraph in a theme, you must be talking about something. After you have decided upon what you will write in a paragraph, write a sentence telling what the paragraph is about. This sentence, which "lets the cat out of the bag," is called a "topic sentence." When you have promised in the topic sentence to write about something, you must go ahead and write about it in the paragraph.

If you cannot put the thought of any paragraph into one sentence, write more than one sentence and make more than one paragraph.

The following sentences are topic sentences. Select one and write it on a sheet of paper, indenting the first word about an inch; then write a paragraph of about 50–75 words, expanding the topic sentence into a paragraph. Be sure to stick to the subject promised in the topic sentence.

1. School holidays should be taken all at once instead of scattered throughout the year in periods of one or several days.
2. —— (Some boy's name) is the best worker in Murray Vocational School.
3. —— (Some boy's name) is the best boy in the —— Shop.
4. Large classes are better than small classes.
5. Small classes are better than large classes.
6. Boys who carry papers have their own troubles.
7. Every boy should learn some practical trade.
8. I was miles from home without a cent in my pocket.
9. One day last summer I went on a hike.
10. Modern inventions help to improve people's lives.

Usually ten topics are enough, but each boy is permitted to write a paragraph based on a topic sentence of his own if he prefers to think up one for himself. I generally introduce this assignment and its successor with an explanation, showing on the board how to indent the first word of a paragraph and discussing the nature and use of paragraphs. Very simple work on preparing an outline can be taken up at this point if the instructor thinks this advisable.

After the *Topic Sentence* work has been completed, the next assignment is given:

Common Forms of Paragraphs

I. The *Narrative Paragraph* tells a story or relates something that happened. Select one of the following topics and write a paragraph of about 75–100 words. *Give as many details as you can.*

1. The best motion picture I ever saw was . . .
2. Children should be taught to look to right and left before crossing streets.
3. It pays to advertise.
4. A cheap car is a costly car.
5. Correct language is one road to success in life.
6. Practical jokes don't always have funny endings.
7. Hurrying doesn't always save time.
8. The meanest thing I ever did was . . .
9. The meanest thing I ever heard about was . . .
10. The party was a big success.

II. The *Expository Paragraph* explains or makes clear how something is done, made, etc. Pick out one of the following topics and write a paragraph of about 75–100 words. Give details or examples. Compare or contrast things to make your words clearer to the reader.

1. Swimming is a fine exercise for boys.
2. How to (Do, Make, Build, Repair, Operate) something.
3. My Hobby — What it is and why I like it.
4. I'd rather have a (name of car) than a (name of another make).
5. I prefer (name of school subject) to (name of another subject).

III. The *Argumentative Paragraph* tries to prove or disprove something. Write a paragraph of about 75–100 words on one of the following topics, giving your reason for or against:

1. The greatest need of our school is . . .
2. Although it requires a lot of work and is hard, English should be a required subject in a vocational school.
3. Boys in a vocational school should study American history.
4. Seniors should be granted special privileges in school.
5. Drunken drivers should be severely punished.

IV. The *Descriptive Paragraph* pictures, portrays, or describes something. Write a paragraph of about 75–100 words telling how something looks, smells, tastes, feels, acts, etc. Take any one of the following topics. Try to give enough details to make it possible for a reader who does not know anything about the thing to see it in his mind as he reads your descriptive paragraph.

1. Down the street came the world's largest circus.
2. It was a beautiful new automobile.
3. The queerest animal (or anything else) I have ever seen.
4. Murray Vocational School (the building itself, the shops, etc.).
5. Any person, article, or place you know well enough to describe.

I do not emphasize the names of the different types of paragraphs in using this sheet. All I am interested in is having the student write four good paragraphs. If he prefers to write paragraphs without using those suggested by me, I accept them if they are satisfactorily done. This practice gives a student a workable notion of paragraphing, enough to improve his work sufficiently for the level of second-year writing. In this year also each boy writes an average of one theme every other week. After the *Topic Sentence* and *Common Forms of Paragraphs* have been completed, I start stressing the physical setup of themes in order to help boys learn how to produce themes of attractive appearance. Results are slow in coming, but I continue showing students how to improve their themes for two years. By the middle of the junior year most themes are acceptable in appearance, with only a few scattered exceptions, chiefly boys who are absent too often. Once an average student realizes that he will not receive any credit for his work unless it is clean, neat, and properly written, most of his trouble disappears. He learns to make a rough copy first; then he checks it for mistakes, copies it neatly, and turns in his best work to be corrected and credited.

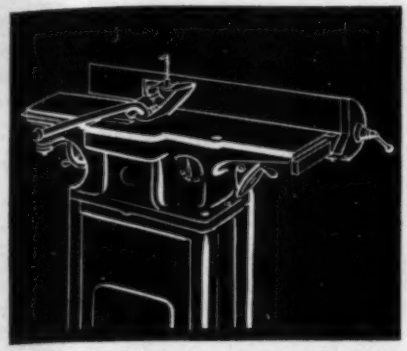
In the junior year themes must conform to the following:

Suggestions for Improving Themes

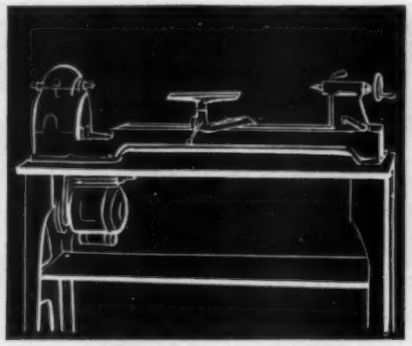
Physical Setup:

1. Leave a *four-way* margin: top, bottom, and both sides.
2. Place the title on the first line, and leave about the same amount of space on both

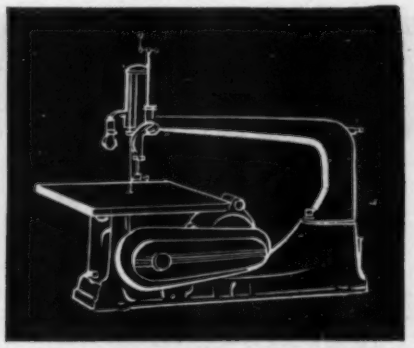
(Continued on page 12A)



6" Jointer For handling narrow strips, planing thin stock, surfacing, and beveling, as well as jointing. Its versatility alone makes this machine a good investment. Dual Purpose Guard speeds planing, protects operator.



Four Speed Lathe Built chiefly for wood turning, cast iron head stock and double row pre-loaded spindle bearings make it an ideal machine for metal spinning. Give your students the advantage of Walker-Turner design!



24" Jig Saw Four operating speeds, easily and quickly adjusted blade tension. Designed to meet the needs of industrial arts and vocational schools. Cuts wood, paper, fibre, plastics, bone, all kinds of sheet metal.

For greater student safety and shop economy specify

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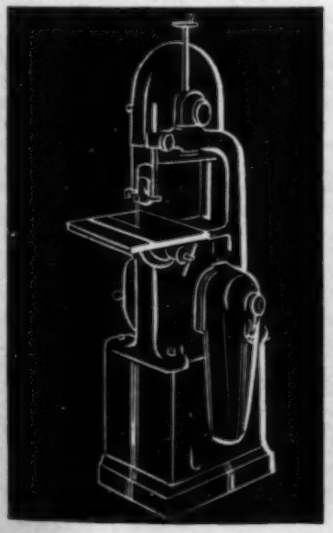
10" Tilting Arbor Saw

— Students can do better work, learn faster on a Walker-Turner power tool. This Tilting Arbor Saw cuts *exactly*. Controls are conveniently located, for ease of operation. It's well-guarded where it should be guarded, for complete protection. And built throughout for long machine life.

16" Band Saw Safety first — and built to last! These are features, too — as important to schools as the speed, accuracy and operating ease of Walker-Turner's new 16" Band Saw. For wood and metal-cutting



15" Drill Press Use it for drilling, sanding, mortising, grinding, spot polishing metal surfaces (of machines), removing rust and scale, or shaping ornaments — this versatile power tool is a school shop in itself!

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Tough special steel ribbon with easy-reading graduations. 25, 50, 75 and 100 foot lengths.
Set of Tools No. 902-B
Includes 12" combination square, 1" micrometer, calipers, dividers, 6" rule, center gage, center punch.
Combination Square No. 11
With black crackle finish, in-built level and scriber, reversible locking bolt.
Letter Size Drill Gage No. 198
Hardened and ground with bright finish. Checks sizes from "A" to "Z".
"Satin Chrome" Micrometer No. 230
No-glare finish, quick-reading figures, tapered frame. 1" capacity.
Protractor-Depth Gage No. 493-B
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ENGLISH FOR TRADE AND VOCATIONAL SCHOOLS

(Continued from page 258)

sides of it. Do not use quotation marks at the beginning and end of the title. Capitalize all important words (especially nouns and verbs) in title. Use small letters for *a, an, and, but, or, for,* and prepositions *in, on, by, with, from, etc.*

3. Indent the first word of each paragraph about one inch.
4. Keep *loop letters* (*h, b, l, k, e*) open.
5. Use large paper and write on only one side of the paper.
6. Use a dictionary to find the correct spelling of doubtful words.
7. Be sure that your theme is clean, neat, and long enough to say all that you want to tell about your subject.

About the middle of the junior year I start to teach a few simple tricks for improving the quality of written work. By this time most of the boys can recognize compound sentences, complex sentences, and prepositional phrases; they also know how to punctuate sentences fairly well. Several times during the junior year I spend a few minutes at the board, showing students how to improve the style of their work, using dull, stodgy, childish themes as examples of what *not* to do. Older boys quickly see the difference between a babyish theme and a mature, adult paper and are quite willing to accept suggestions for improving their own written work.

(To be continued)

ASSOCIATION NEWS

(Continued from page 6A)

Hampton Institute; Lawrence C. Sechrest, DeKalb, Ill.; and William E. Warner.

The annual banquet was held Friday at 6 p.m. Chairman on this occasion was John M. Hurley, director of industrial arts, Brooklyn, N. Y.

Dr. Edgar Fuller, Washington, D. C., then spoke on "Some Crises in Education Today."

The Ship's Program, consisting of entertainment and the distribution of prizes, was then ably put on by E. Burnham Dunlon, deck officer, and Chester L. Messmore, captain. The prizes for the evening were contributed by the 30 firms who were exhibiting at this convention.

The third general session on Saturday morning was presided over by Virgil A. Poling, Dartmouth College, Hanover, N. H.

John R. Ludington, from the U. S. Office of Education, gave the main address "The American Youth and the Industrial Arts Influence." This meeting was followed immediately by the reports of the various vice-presidents and committees of the A.I.A.A.

The new officers of this association will be announced shortly.

The 1952 annual convention will be held at Chicago, and 1953 at Detroit.

Twelve Canadians attended the meetings. They expressed the hope that the association would hold one of its future conventions in Canada.

EPSILON PI TAU INITIATES AT OSWEGO, N. Y.

Sunday, March 11, Phi Chapter of Epsilon Pi Tau at State Teachers College, Oswego, N. Y., honored 14 industrial-arts undergraduate students when they were initiated into Epsilon Pi Tau. The men so honored are: W. Welser, A. Vita, J. Hartness, J. Nolfo, H. Haggblom, G. Ferget, P. Chamberlin, R. Spring, A. Schilling, R. MacLagan, R. Pascuzzo, L. Robinson, R. Langbartel, and R. Rulon.

(For illustration see p. 4A)

Saturday, the day before initiation, the men were given oral examinations in order to determine their eligibility for Epsilon Pi Tau. The faculty-student inquisition teams were headed by faculty sponsors James Hastings, Robert Helsby, and Paul Kleintjes. On the night of the initiation the new members were honored at a banquet, the high light of which was the presentation of keys by Dr. Gordon O. Wilber, director of division of industrial arts at Oswego.

FLORIDA INDUSTRIAL ARTS ASSOCIATION CONVENTION

The Florida State Industrial Arts Association held its annual meetings in Tampa., Fla., March 29–31 as part of the Florida Educational Association's State Convention. The industrial-arts council of Hillsboro County acted as hosts to the members from all parts of the state. John H. C. Tammeryn was local chairman of the meetings, and Samuel Yost, chairman of the exhibits.

(Continued on page 14A)

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land. These regional vice-presidents aid in the integration of the industrial-arts programs in their districts. They hold regional meetings in the fall at the same time as the Florida State Educational Association holds their regional meetings. This allows participation in both regional and general meetings of all the members of the Industrial-Arts Association both spring and fall. —*J. A. Borden.*

THE TENTH ANNUAL TEXAS VOCATIONAL ASSOCIATION MEETING

The Tenth Annual Texas Vocational Association meeting was held April 5 through 7 in Dallas. Many developments of great importance to trade and industrial education people highlighted the session. The contributions of Dr. L. S. (Bill) Hawkins greatly enlivened the several programs in which he had a part.

R. D. Sanders, representing agriculture, became the new president of the Texas Vocational Association. President of the American Vocational Association, H. C. Fetterolf, addressed the opening general session Friday night, April 6, 1951, in the Crystal Ballroom of the Baker Hotel.

The Texas Vocational Industrial Association was created during the 1951 meeting of the T. V. A. The formulation of this new association creates hope for increased solidarity in the ranks of trade and industrial teachers.

Floyd Spears, machine-shop instructor at Kilgore College, was elected vice-president of the Texas Vocational Association representing trade and industrial education. Mr. Spears also became president of the newly formed Texas Vocational Industrial Association.

A. B. O'Connor, co-ordinator of the Fort Worth Technical Institute, was elected vice-president of the new industrial organization, and W. E. Clitheroe, machine-shop instructor of the Pasadena (Texas) Vocational School, became its secretary-treasurer. Dues for the year were set at $5.

Joe L. Reed, teacher trainer of the University of Texas, presided at a breakfast meeting of Sigma Chapter of Iota Lambda Sigma Fraternity. The early morning program included an informal address by Bill Hawkins.

Charlie Roper, deck officer for the Ship, piloted the well-laden vessel to the Hotel Adolphus dockside. Everyone in attendance at the 1951 T. V. A. will long remember the fine efforts of the exhibitors in displaying an outstanding group of machines, tools, and equipment. — *Earl M. Bowler.*

ASSOCIATION NEWS

(Continued from page 12A)

The industrial-arts program was high-lighted by a significant address by Thomas D. Bailey, State Superintendent of Public Instruction. His topic, "What Industrial Arts Can Do for the Youth of Florida" was heard by over one hundred members at the luncheon meeting on Friday, March 30. The second speaker was W. W. Mathews, principal of the Miami Jackson High School, who discussed, "What One Outstanding Program in Industrial Arts Is Doing." This was followed by a panel and open discussion of the problems on how to set up an industrial-arts program.

Displays of shopwork and drawings were placed on exhibition at the Armory where the general sessions were held. It is difficult to describe the quantity and quality of the displays, as it surpassed anything of its kind to date. The interest of the general public and members of the educational association more than compensated for the work of those exhibiting.

During the business session the following officers were elected for 1951–52: president, E. W. Avery; first vice-president, John Tammeryn; secretary-treasurer, Charles M. King; publicity director, J. A. Borden; promotion director, N. M. Faulds; state consultant, Walter Williams; regional vice-presidents, (1) Norman Dando, (2) O. D. Roberts, (3) Milton Scott, (4) I. D. Henson, (5) C. L. Tribble, (6) Thomas Strick-

GEORGIA INDUSTRIAL ARTS ASSOCIATION

The annual meeting of the Georgia Industrial Arts Association was held at the Smith-Hughes Vocational School, Atlanta, Ga., on March 23. Sixty-five teachers and school administrators attended the general meeting which was held at 10:00 a.m.

Featured on the program of the general meeting were demonstrations by staff members of Georgia Teachers College, Collegeboro, which included: "Silk Screen Printing" by Edgar C. Godfrey; "Leather Carving" by Fred Kennedy; and "Keene Cement" by Donald F. Hackett. A color film strip of the Ford Motor Company Industrial Arts Award winners was presented by Dr. O. S. Harrison, head of industrial arts, Uni-

(Continued on page 17A)

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ASSOCIATION NEWS

(Continued from page 14A)

versity of Georgia, Athens, Ga. A portable electric drill and a variety of textbooks were given as door prizes at the close of the meeting.

E. A. Wolfe, Baxley, Ga., presided at the annual business meeting and officers elected for the coming year are:

E. A. Wolfe, Baxley, president; J. Creel, Atlanta, vice-president; Professor E. C. Godfrey, Georgia Teachers College, secretary-treasurer; Dr. O. S. Harrison, University of Georgia, chairman of executive committee.

THE FRED C. WHITCOMB LABORATORIES

At the annual conference of the Miami Valley Industrial Arts Association, held at Miami University, Oxford, Ohio, on April 14, it was announced that the new industrial-arts education section of that institution would be named the Fred C. Whitcomb Laboratories in memory of the late Dr. Whitcomb, who was the director of industrial education at Miami University from 1906 to 1941.

THE CALIFORNIA, PENNSYLVANIA, STATE TEACHERS COLLEGE CONFERENCE

The 16th annual Pennsylvania Industrial Arts Conference was held at State Teachers College, California, Pa., on April 27 and 28, 1951.

The Friday afternoon program was devoted to demonstrations in art, metal, the making of costume jewelry, ceramics, electricity, foundry work, graphic arts, machine shop, ornamental iron, plastics, sheet metal, and woodworking.

The Saturday morning session presented a craftsmen's fair, furniture upholstering, photography, woodwork, and work with plastics.

J. Phillip Young, director, industrial arts, Neville Township High School, Pittsburgh, Pa., was the chairman of this session.

The demonstrators were John J. Bellas, State Teachers College, California, Pa.; Michael M. Kuzma, teacher, Dayton, Ohio; Ray Cotterell, Houston, Pa.; and Spencer Wells, teacher, Mt. Lebanon, Pa.

At the Saturday luncheon Dr. C. Herman Grose, deputy superintendent of public instruction, Harrisburg, Pa., was toastmaster.

The main speaker on this occasion was Ralph L. Lee, Birmingham, Mich. He spoke on "Craftsmanship and the Human Factor in the World Today."

There were also excellent exhibits of work produced by college and public school students. About 21 commercial exhibitors presented their wares at this conference.

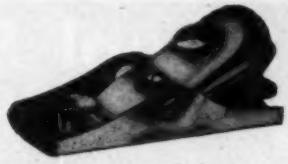
I. E. SUPERVISORY CONFERENCE

The Industrial Educator's Supervisory Conference will be held at Bradley University, Peoria, Ill., on August 9, 10, and 11, 1951.

Harlan J. Shufelt, supervisor of industrial arts, Racine, Wis., is the chairman of the organization, and Dr. Fred Strickler, professor of industrial education, Bennett College, Bradley University, Peoria, Ill., is the executive secretary.

Visitors are cordially invited to attend.

School Shop Favorites



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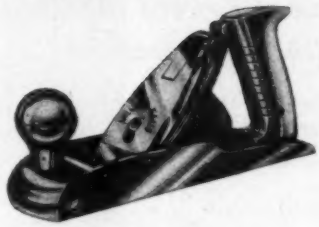

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THE WAVAE CONVENTION

The 15th annual convention of the Wisconsin Association for Vocational and Adult Education was held at the Schroeder Hotel, Milwaukee, Wis., on May 2 to 5, 1951.

John TePoorten, WAVAE's president, presided at the first general meeting on Friday morning, May 4. The main speakers were J. Donald Phillips, assistant director of the Continuing Education Service, Michigan State College, East Lansing, Mich.; and Paul S. Weaver, dean of religious life and chairman of Division of Religion and Philosophy, Stephens College, Columbia, Mo. Their subjects were "Students Are People," and "The Tragedy of Success."

At the general meeting on Saturday morning, Dr. M. D. Mobley, executive director, American Vocational Association, Washington, D. C., spoke on "The Role of Vocational Education in Providing Security and Freedom to the Individual and the Nation."

C. L. Greiber, director, State Board of Vocational and Adult Education, Madison, chose for his subject "The State Picture."

Numerous section meetings were slated for Friday afternoon.

Harry Sears, American Technical Society, Chicago, was captain at the Skiff Program.

At the Wednesday afternoon meeting of the Wisconsin Association of Directors of Vocational and Adult Education, John G. Ausman, Manitowoc, acted as chairman. The speakers at this meeting were C. L. Greiber, and Miss Mary E. Switzer, director, Office of Vocational Rehabili-

(Continued on next page)

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ASSOCIATION NEWS

(Continued from previous page)

tation, Federal Security Administration, Washington, D. C. They discussed "General Administrative Problems" and "New Developments in Vocational Rehabilitation."

The chairman for the Thursday sessions, both morning and afternoon, was Harvey Genskow, Shorewood.

The topic in the afternoon was "Tools for Democracy," and it was presented by J. Donald Phillips.

About twenty exhibitors took advantage of showing their wares to the WAVAE members who attended this convention in large numbers.

♦ At the annual meeting of the New Jersey Section of the American Vocational Association, held in conjunction with the New Jersey Vocational and Arts Association, at Asbury Park, N. J., on March 16, 1951, the following were elected to office: Charles A. Haas, president; Richard Lane, vice-president, trades and industry; Lentz Gold, vice-president, industrial arts; Joseph E. Bowen, vice-president, distributive education; Samuel Martin, life membership; John A. McCarthy, adviser; Owen E. Kiser, vice-president, agriculture; Miss Selman Kassenoff, vice-president, home economics; Henry J. Zanbalari, secretary; and Robert J. Kessler, treasurer.

Dr. M. D. Mobley, executive secretary, American Vocational Association, spoke to the members on "Trends in Vocational Education." — *Charles A. Haas.*

♦ The Southeastern Wisconsin Industrial Arts Conference was held on April 7 at the Norris Farm School for Boys near Mukwonago, Wis.

♦ The officers of the Industrial Education Club, Iowa State College, Ames, Iowa, for the school year 1951–52 are: president, John O'Connell; vice-president, Al Sherick; secretary, Alice Hammond; treasurer, Bob Boldt; social chairman, Ronald Holdsworth; publicity, Jerry Phillips; program chairman, F. E. Stevenson; ag. council (senior), Leonard Bengston; (junior) Vernon McCabe.

♦ ARTHUR HAULER, chairman of the Industrial Arts Education Department, of Oswego Teachers College, Oswego, N. Y., presented the purposes of industrial arts and an illustrated lecture of school shop planning at the First District Industrial Arts Association meeting at Georgia Teachers College, Collegeboro, Ga., Monday, February 26.

Mr. Hauler, in presenting his subject, brought out the necessity of planning the school shop to aid in attaining the objectives of the course. With activities carefully selected, planned, and organized, a maximum in pupil participation and development may be expected. — *Donald F. Hackett.*

Personal News

JOHN A. LINKE DIES

John A. Linke, 80, old-time leader in vocational-agriculture education, died on March 12, 1951, at Tucson, Ariz.

Mr. Linke was born near Clifford, Ind., on March 6, 1871. He received the B.A. degree from Hope Normal School, Hope, Ind., in 1897. He earned the M.A. degree from Indiana University in 1903 and the B.S. degree in agriculture from Purdue University in 1915.

His educational service record is as follows: 1889–95 — teacher in the county schools; 1899–1913 — superintendent of schools at Hope, Ind.; then at North Salem, Ind., Brownstown, and Seymour, Ind. Then he spent two years with the Agricultural Extension Department at Purdue University. After that he was appointed to the Federal Board for Vocational Education, September 27, 1917, as special agent for agricultural education.

On December 16, 1934, he was made chief of the Agricultural Education Service, U. S. Office of Education, and retired on March 31, 1941.

♦ DR. J. C. WRIGHT has retired to his home in Chevy Chase, Washington, D. C., after serving as consultant on vocational program planning with the Institute of Inter-American Affairs in Brazil, South America.

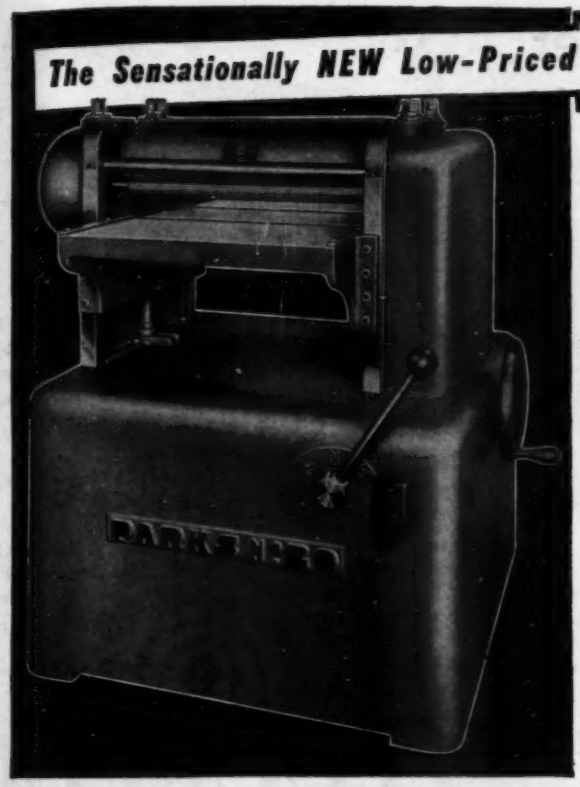
♦ DUDLEY M. CLEMENTS, assistant chief of the agricultural service, United States Office of Education, and for more than 30 years a recognized leader of vocational education in agriculture, died July 25 at Prince Georges General Hospital in Cheverly, a suburb of Washington, D. C., after an illness of about two months.

He was a member of the staff of the Office of Education since 1936.

♦ FRANK D. DOLAN, educational consultant, The Ordnance School, Aberdeen Proving Ground, Md., died recently after a prolonged illness.

♦ EMERSON WILLIAM MANZER will be on the 1951 summer school staff of the Western College of Education at Bellingham, Wash. He will teach art metal and graphic arts.

(Continued on page 20A)



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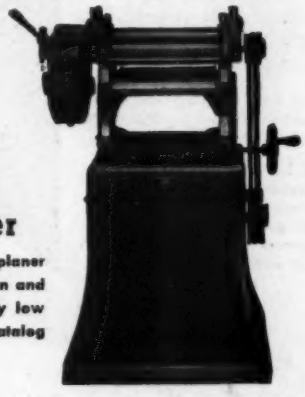

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PERSONAL NEWS

(Continued from page 18A)

♦ J. R. MULHOLLAND, director of industrial arts in Kanawha County, W. Va., has been appointed to the advisory committee of the Ford Motor Company's industrial-arts awards program.

♦ JAMES A. CREW, instructor of electricity at Dunwoody Industrial Institute, Minneapolis, Minn., for upward of thirty years, retired recently.

♦ LLOYD BENSON is co-ordinator of work experience in Madison, Wis.

♦ LEON BIBB is working toward his doctor's degree at the University of Missouri. He is teaching part time at the engineering school of the university.

♦ JOHN T. DAVIDSON is teaching a one-man industrial-arts shop at Seaside, Ore.

♦ W. S. HARDY is an instructor in the industrial-arts department of Douglas High School in Webster Grove, Mo. He also is president of the Industrial Arts Teachers' Association in the St. Louis Area.

News Notes

♦ The Ordnance School at Aberdeen Proving Ground, Md., is in urgent need of instructors for teaching to military personnel the following subjects: ammunition and components, clerical fields, ammunition renovation, storage and supply, automotive supply, material preservation, storage, electrical and fuel systems, track vehicles, automotive engine, track chassis, machine shop, welding, blacksmithing, procurement, production management, maintenance, inspection, instrument repairing, watch repairing, electrical director (heavy), electrical director (light), remote control systems (repair), fire control or small arms. They will be required to devise lesson plans and instruct trainees in the performance of their specific duties in the optional field.

Four years of progressively responsible experience as an instructor in an adult education program, secondary school, college, industrial establishment, or government agency is the requirement. Age limit, 18 to 62 years. Salary for position, $3,825 to $4,575.

The Ordnance School will also take suitable persons with a starting salary of $3,100 and give them training so that in six months they can qualify for the $3,825 salary.

For forms and further information address the Executive Secretary, Board of U. S. Civil Service Examiners, Aberdeen Proving Ground, Md.

♦ H. P. Harshbarger, educational director of Greer Shop Training, Inc., 2230 S. Michigan Ave., Chicago 16, Ill., announces that a number of free teacher training scholarships have been set up for prospective teachers who will be graduated from college in 1951.

The courses will be given in accelerated four-week terms. Three of these will be offered starting as follows: first section starts June 4, 1951; second section, July 9, 1951; and third section, August 6, 1951.

Greer Shop Training, Inc., is licensed by the State of Illinois as a Trade School, and their courses are approved for G.I. training.

Courses in auto mechanics, body and fender repair, Diesel mechanics, machine shop, gas and arc welding, refrigeration, and piano tuning, are offered.

Application blanks may be obtained from Mr. Harshbarger.

♦ The Mexican Art Workshop announces its 5th annual session in Taxco, Mex., from July 10 to Aug. 14. The project, which combines silvercraft, painting, and Spanish language study, offers the opportunity to live and work in Mexico's picturesque mountain village. Field trips, fiestas, social contacts in the community, and meetings with prominent Mexican artists and craftsmen are an important part of the program.

After the Workshop session an optional sightseeing trip has been specially arranged for those who are interested in visiting other regions of Mexico.

The special feature of the silvercraft workshop is the opportunity for members to work as apprentices in the native silver shops for which Taxco is famous, and to observe the techniques of the master craftsmen.

Through an affiliation with Syracuse University members of the Syracuse faculty conduct the courses at the workshop in association with Mexican instructors, and college credits are available.

The cost for a 4- or 5-week session is $230 and $275 respectively. These tuition fees include the instruction, field trips, recreation, and all living costs in modern hotels during the stay in

(Continued on page 24A)

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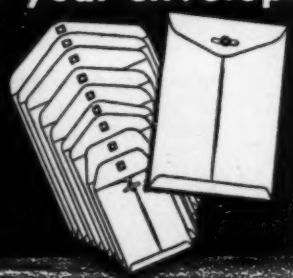

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When you want extra safety and additional protection for your large or bulky materials to be mailed, then you should use a Clasp Envelope. These envelopes are built of rugged, heavy stock, equipped with a burrless metal clasp, and come in a wide variety of sizes. They are used in many cases to carry heavy magazines, machine parts, steel wool, shavings, instruction manuals, photographs, cloth or fabric samples, and similar large items that require complete protection but do not call for the expense of a box container. The clasp feature permits you to insert and extract the contents several times. The clasp also allows you to send material through the mail at third class rates yet guarantees you of a protective seal.

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The stack molding technique, illustrated here, was made possible by using Sterling flask sections to step up casting production. Ten flask sections are being poured at a time. A common sprue through the stack feeds the molten metal to runners leading to individual casting cavities.

Sterling Steel Flasks are ideal for stack molding because they are built to withstand terrific pressures. A reinforcing rib around the side prevents distortion and misalignment of the stacked molds. Top and bottom have solid sand flanges. Full width bearing.

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SHOP EQUIPMENT NEWS

NEW LATHE TOOLHOLDER

The South Bend Lathe Works has just put on the market a new toolholder of the universal type. Known as the 10 in 1 toolholder, it is supplied in five sizes for South Bend Lathes and can be adapted for use on some other makes.

Patent Pending

South Bend 10 in 1 toolholder

It is equipped with a screw adjustment for tool height. Once adjusted, tools of the same type can be changed without disturbing the height adjustment. A self-aligning knurling head and a pair of medium diamond knurls accompany the toolholder as standard equipment. Coarse and fine diamond knurls, and coarse, medium, and fine straight pattern knurls are available. Boring tools, cutting-off blades, and a set of four ground cutter bits are available for boring, cutting off, turning, facing, and threading operations.

For further information and prices write to the *South Bend Lathe Works, South Bend 22, Ind.*

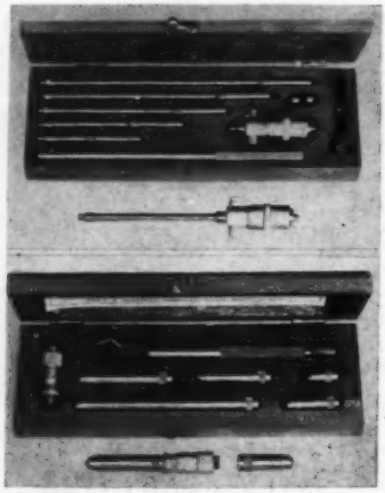
For brief reference use IAVE—0601.

TWO NEW STARRETT INSIDE MICROMETERS

Two new inside micrometers, made by The L. S. Starrett Co., Athol, Mass., offer a choice between the equally popular slim, solid rod type and the larger-diameter, lightweight tubular rod type. Both of these inside micrometers are precision tools for internal measurements. Both have the "Satin Chrome Finish," which makes micrometer markings stand out sharp and clear, without glare, thus contributing to faster, more accurate readings and superior corrosion resistance.

Both types also feature quick-reading graduations in thousandths of an inch with all thousandths lines numbered for fast, error-proof reading. In both, the micrometer screw is made with threads hardened, stabilized, and ground from the solid for superior accuracy.

The No. 124 inside micrometers feature interchangeable solid rods (approximately $\frac{5}{32}$-in. diameter), and are available in four different models. No. 124A (2 to 8 in. with 6 rods) and No. 124B (2 to 12 in. with 10 rods) have micrometer heads with ½-in. movement, and are supplied with a ½-in. spacing gauge. No. 124C (8 to 32 in.) has 4 rods, a 1-in. ring gauge and two 2-in. gauges, plus a micrometer head with 1-in. movement. Set No. 124D (2 to 32 in.) consists of the items in Sets A and C. In use, any desired length can be established approximately by attaching one of the rods to the micrometer head, using a spacing gauge when necessary to bring the measurement within the range of the micrometer screw. All contact surfaces are hardened and ground, and provision is made for adjustment to compensate for wear of the screw and contact surfaces.



Above, Starrett inside micrometer No. 124 with solid rods

Lower, Starrett inside micrometer No. 823 with tubular rods

For brief reference use IAVE—0602.

NEW BLACK AND DECKER SAW PROTRACTOR

A new saw protractor for use as a guide in power sawing has been introduced by The Black & Decker Mfg. Company. By using this protractor the operator may make accurate angle cuts.

New Black and Decker saw protractor

The saw protractor is constructed of metal for rigidity, yet it is very light, weighing only 1½ lb. It consists of a straight edge, a segment clearly calibrated in units of 1 deg., and a movable holding arm. The desired angle is set by merely loosening a wing nut on the underside of the holding arm and moving the arm until the indicator points to the correct degree mark. The wing nut is then retightened to prevent slippage of the holding arm.

In operation, the side of the shoe of the power saw is lined up with the protractor's straight edge and the saw is advanced along this edge for quick accurate cuts. On many power saws either side of the shoe can be used depending on the cut desired.

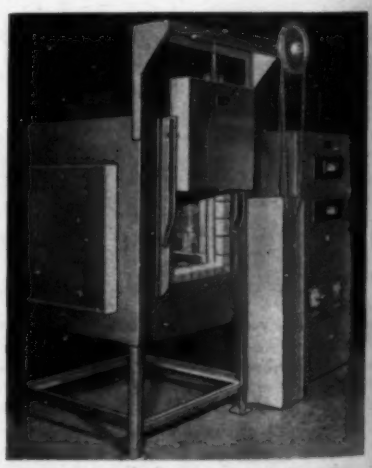
The saw protractor is particularly useful for compound miter cuts when used in conjunction with the bevel adjustment on most power saws. It can also be used for laying out any carpentry work involving angles. Its use is adaptable to practically all portable electric saws.

For further information about this useful accessory write to *The Black & Decker Mfg. Co., Towson 4, Md.*

For brief reference use IAVE—0603.

PERECO HEAT-TREATING FURNACE FOR HEAVY-DUTY WORK

The new Pereco Model FG–7800 Electric Furnace offers a spacious work chamber, accurate temperature controls, and versatile operating features. It handles all heat-treating temperatures up to 2500 deg. F., with an absolute maximum of 2700 deg. F. and can be supplied completely gastight with atmosphere connections.



Pereco Model FG-7800 electric heavy duty furnace

The separate control panel is equipped with voltage-regulating, multi-tap transformer; temperature indicator and controller; magnetic contactor; and a high limit cutoff which acts to safeguard the furnace from accidental overheating.

Overall size of this model is 33¼ in. wide,

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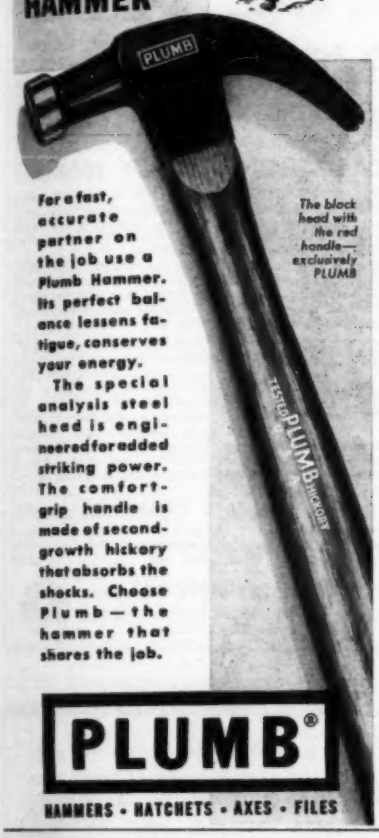

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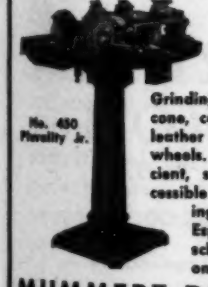

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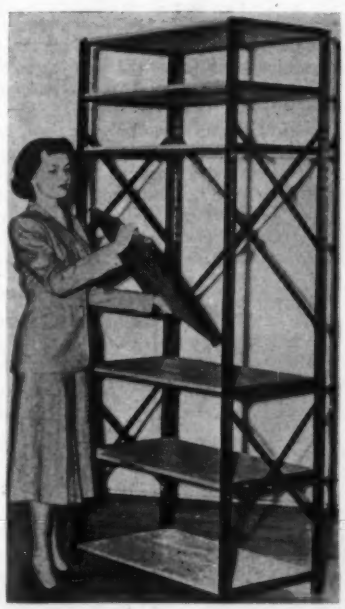
For further information write to *Pereny Equipment Co., 893 Chambers Road, Columbus 12, Ohio.*

For brief reference use IAVE—0604.

LYON'S STEEL-WOOD SHELVING

Lyon Metal Products, Inc., manufacture a complete line of adjustable steel-wood shelving in addition to its regular line of steel shelving for uses in all kinds of shops, stockrooms, assembly lines, industrial plants, and institutional buildings.



Lyon's steel-wood shelving

Although steel shelving is still available, the Lyon Steel-Wood Shelving line offers the customer a much shorter date of delivery.

Lyon Adjustable Steel-Wood Shelving presents a clean appearance combined with the features of sturdiness, strength, and safety found in steel shelving.

Rigid steel uprights support the hardwood shelves in such a way that no bolts are used to attach the shelves to the steel uprights.

Lyon Steel-Wood Shelving is available in dimensions of 3 ft. in width, 1 or 1½ ft. in depth, and 7 ft. in height.

Installation of the shelving is easy because the only tools that are required are a hammer and a screw driver.

For further information, address *Lyon Metal Products, Inc., Aurora, Ill.*, or see your local dealer.

For brief reference use IAVE—0605.

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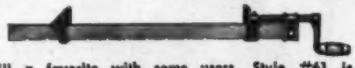

Still a favorite with some users, Style #61 is a "notched bar" type steel bar clamp. Somewhat slower in operation than our "fast-operating" bar clamps, but just as carefully designed. Will provide long, satisfactory service.

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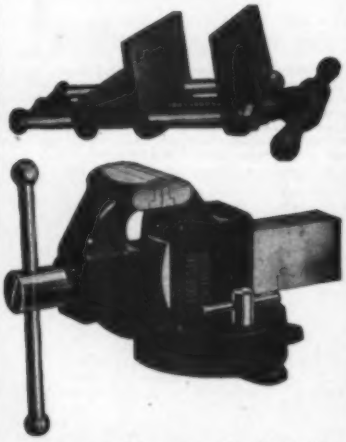

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NEWS NOTES

(Continued from page 20A)

Taxco. Information regarding the post-Workshop Tour, and the cost of transportation from the United States to Taxco will be furnished on request. Write to (Mrs.) Irma S. Jonas, Exec. Dir., 238 East 23rd Street, New York 10, N. Y.

♦ The first catalog folder on plastic surfaced plywood has just been issued by Douglas Fir Plywood Association for the use of dealers, architects, engineers, industrial designers, and users.

This catalog describes the types of plastic surfaced Douglas fir plywood, and the properties of the overlay panels. It also describes some of the uses to which this material is put by the building trades and industry.

Also included are recommendations for use of the new premium-surface panel material which combines all the desirable properties of fir plywood and plastics.

For a free copy of this handy guide which is published in letter size for easy filing just write *Douglas Fir Plywood Association, Tacoma 2, Wash.*

♦ A comprehensive program of courses in the field of industrial education will feature the 1951 summer session offerings of the New York State School of Industrial and Labor Relations at Cornell University.

The industrial education program will begin July 2 and continue through August 11. Courses will be given in supervision and administration of industrial education, training in industry, development of training materials, vocational-technical training, and industrial education in smaller communities.

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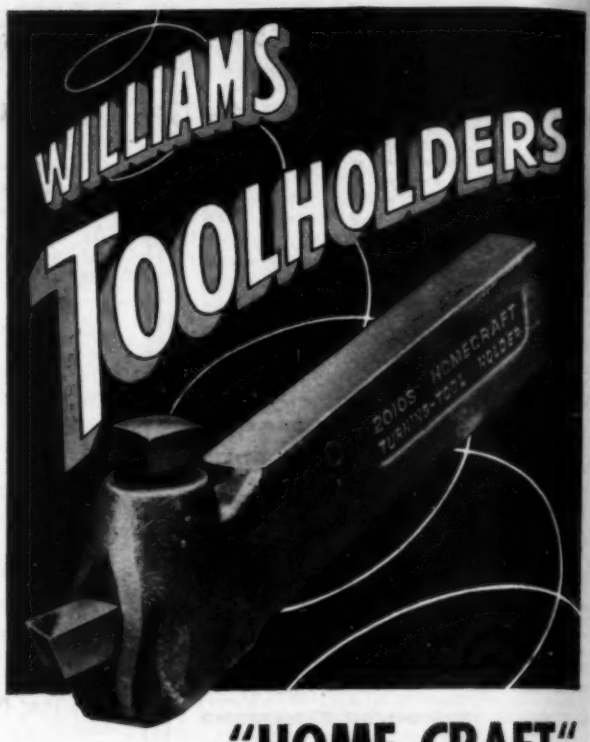

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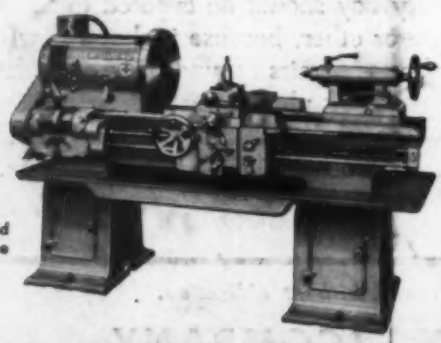

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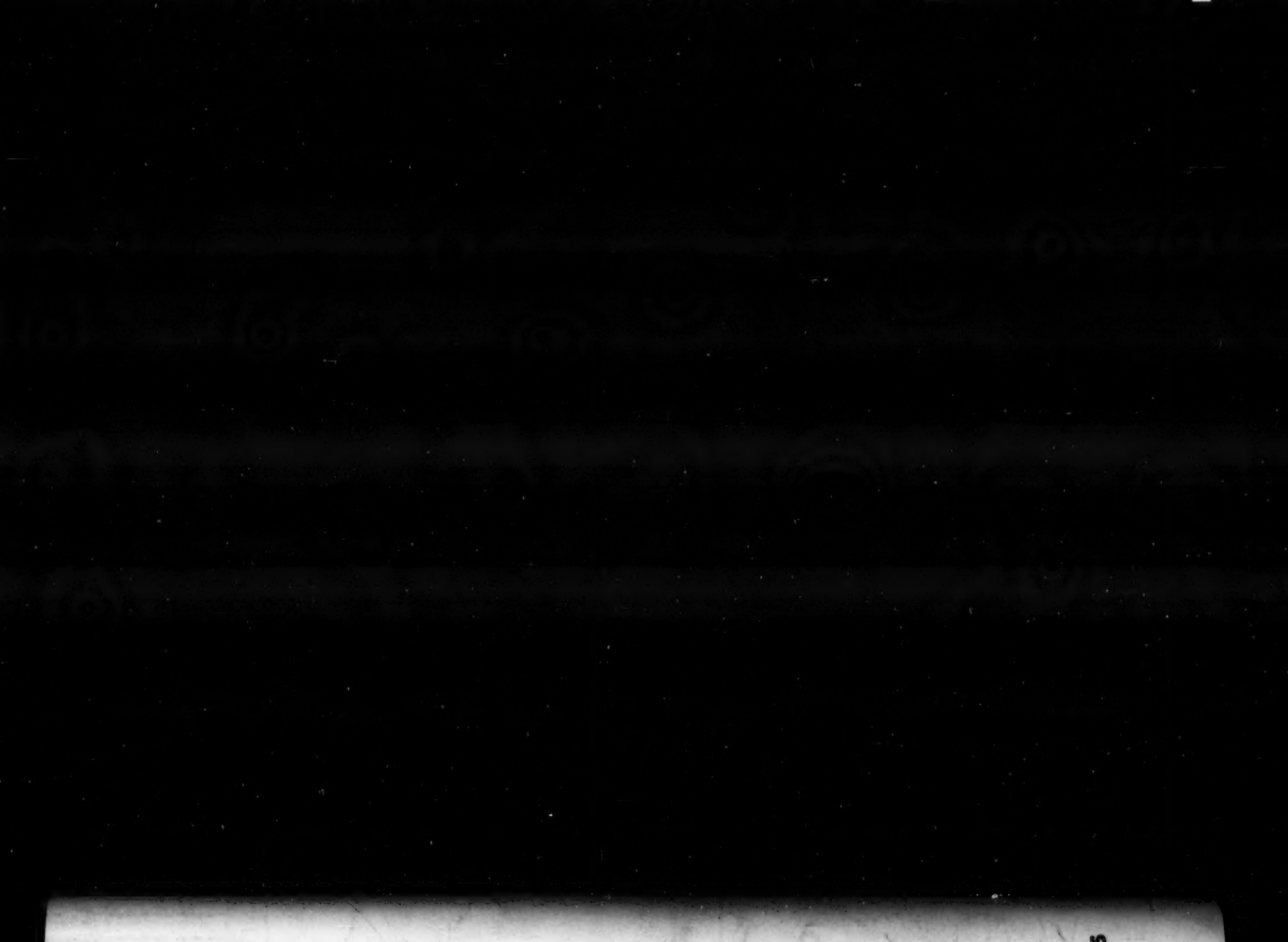
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